Vol. I

Digitized by the Internet Archive
in 2026

https://archive.org/details/homeschoolrefere0001vari

THE HOME AND SCHOOL REFERENCE WORK

A Library of

Practical, Authoritative Information

Drawn From Every Department of Human Knowledge

Prepared by more than 200 of the World's foremost educators

VOLUME I

THE HOME AND SCHOOL EDUCATION SOCIETY

NEW YORK CHICAGO LOS ANGELES

1922

COPYRIGHT 1913, 1915, 1916, 1920, 1921, 1922
BY
H. M. DIXON

PRESS OF THE
BLAKELY-OSWALD PRINTING CO.
CHICAGO

224

INTRODUCTORY NOTE

Information stored in the mind is the foundation on which rests that practical education so vitally necessary at the present day. To furnish that information in a form condensed yet accurate in statement, so arranged as to be readily accessible, is the object of this Reference library.

Not many years ago the value of a reference work was estimated on the basis of its gross volume. The emphasis was placed on quantity rather than quality, and every available editorial and mechanical device known was employed to increase the bulk of the work.

More recently a much needed reform has been effected in this respect and condensation in volume has been the aim. Venturesome publishers began to throw out much of the "lumber." The result was a decided gain in real worth of publication.

Experience soon showed that only one step though in the right direction had been taken, the condensed sets hitherto published still fall short of the ideal. They still carry too much ballast since they treat of such subjects as (a) dictionary subjects for which only definitions are needed and consequently any good standard dictionary suffices; (b) technical subjects of interest to specialists only, or appropriate only to highly technical treatises, and (c) subjects which no longer concern the living present, as many topics in ancient and medieval history.

I realized the inherent weakness of these publications and felt there was urgent need in the home and in the school for a reference work filled with condensed, practical, live-issue information, from which all dead and outworn material should be eliminated, and I further felt that my long experience as a publisher and educator and familiarity with home needs fitted me for the task of producing such a work. I therefore determined to undertake the labor and expense involved in the project.

Having resolved on the undertaking, definite plans of execution were formed and in carrying out the same, I was very fortunate in enlisting the hearty co-operation of prominent educators from all sections of the United States and Canada. Every state superintendent in the Union rendered some assistance as well as did many of the more prominent college and university presidents and city school superintendents. I was further fortunate in organizing an exceptionally strong corps of active assistants composed of well known educators and writers. As showing the immense amount of labor required to produce the work in accordance with my plans, I will add that over 200 leading educators contributed to its success.

To secure balance and adequate treatment, the work in its preparation was divided into more than thirty departments. By this arrangement, no important topics were omitted. The articles in each department were prepared by specialists. Finally, every state article was revised by some authority in the state concerned and the articles descriptive of all important cities were revised by some one whose position entitled him to speak with authority. In order to secure uniformity of treatment, all these articles were subject to my personal supervision and were thus brought in conformity to the general method of treatment adopted.

A glance at the list of departments embraced in the scope of our work shows that we have gleaned from every field of learning, but this very extent is convincing evidence that a judicious selection of articles to be included was necessary. Further examination discloses that while condensation is our aim, we have been liberal with space for important articles. To illustrate, biographs of men and women whose influence has been epoch-making—such as Longfellow, Lincoln, Washington, Franklin—are given with exceptional fullness, and the same course has been followed in our treatment of topics which claim the eager interest of all earnest men and women today, topics which expand our mental horizon, such as the wonders of Electricity, of Astronomy, of New Knowledge generally, which prophesy of more wonderful advance soon to be. This has necessitated the elision of some topics of outgrown interest. The exercise of this judicious selection and wise liberality has been in keeping with my original aims and is what gives such unique value to THE HOME AND SCHOOL REFERENCE WORK.

Having in mind the needs of busy teachers and parents not less than those of inquisitive children, I made simplicity of language and statement an end to be sought in the treatment of all topics. As a rule, technical terms are avoided, or if necessary, they are explained. Pronunciation is indicated by phonetic spelling, and long articles are subdivided into sub-topics. Attention is called to the large number of half-tones, colored plates, and clear graphics. These illustrations do more than simply explain the text, they beautify and adorn the entire work.

No expense of labor, time or money has been spared to make this work a fit expression of my desire to assist in the educational work of our homes and schools. To effectually carry out my designs, however, it was necessary that these volumes be sold at a price that will place them in every American home and put them on the shelves of every American school. Should the future disclose that the very considerable outlay of labor and money required in this the supreme effort of my lifetime is to be commercially unremunerative I shall of course be disappointed. But I am able to affirm in all sincerity that the disappointment I would then feel will not be so much for the loss sustained as because I will have failed to realize a long-cherished ambition to make a contribution to the enlightenment and therefore the happiness of my fellow men.

H. M. DIXON.

H. M. Dixon

THE HOME AND SCHOOL REFERENCE WORK

EDITOR-IN-CHIEF

WILLIAM F. ROCHELEAU

Director of Training School, Southern Illinois State Normal University. Author of "Great American Industries," etc.

MANAGING EDITOR

H. M. DIXON

ASSOCIATE EDITORS

EMORY ADAMS ALLEN

Author of "History of Civilization" in eight volumes; "The Knowledge Book" and other Literary, Educational and Reference Volumes

LORAN D. OSBORN

Chancellor, Des Moines University, Des Moines, Iowa

CONRAD E. PATZER

Supervisor, Practice Teaching, State Normal School, Milwaukee, Wis.

BERTHA M. WHITE

Northwestern University
Writer and Literary Critic
Evanston, Ill.

CONTRIBUTORS AND REVIEWERS

ADEE, J. N.

Supt. of Schools,
Johnstown, Pa.

ALDERMANN, EDWIN A.

President, University of Virginia
Charlottesville, Va.

AVERY, SAMUEL

Chancellor, University of Nebraska
Lincoln, Nebr.

BAILEY, EDWARD L.

Supt. of Public Schools
Jackson, Miss.

BAILEY, LIBERTY HYDE

Cornell University
Ithaca, New York.

BAKER, FRANK COLLINS

Curator, Chicago Academy of Sciences
Chicago, Ill.

BARRETT, STEPHEN M.

Professor of Educational Psychology and Science of Teaching, University of Oklahoma
Norman, Oklahoma

BEEDE, FRANK H.

Supt. of Schools
New Haven, Conn.

BENEDICT, HARRY Y.

Dean, College of Arts, University of Texas
Austin, Texas

Contributors and Reviewers

BENTON, GUY P.,
President, University of Vermont,
Burlington, Vermont

BIERCE, LEE H.
Secretary, Association of Commerce
Grand Rapids, Michigan

BIRGE, EDWARD A.
President, University of Wisconsin
Madison, Wis.

BLUE, JOHN
Librarian, Provincial Library
Government of Alberta
Edmonton, Canada

BOND, J. L.
State Supt. of Public Instruction
Little Rock, Arkansas

BOND, W. F.
State Supt. of Public Education
Jackson, Miss.

BROOKS, STRATTON D.
President, University of Oklahoma
Norman, Oklahoma

BROWN, ELMER ELLSWORTH
Chancellor, New York University
New York, N. Y.

BRUBACHER, A. R.
President, University of Oklahoma
Norman, Oklahoma

BRYAN, WILLIAM L.
President, University of Indiana
Bloomington, Indiana

BUTTERFIELD, E. W.
State Supt. of Public Instruction
Concord, New Hampshire

BUCHTEL, HENRY A.
Chancellor, University of Denver
Denver, Colo.

CALLAHAN, JAMES M.
Professor of History, University of
W. Va.
Morgantown, W. Va.

CAMPBELL, PRINCE L.
President, University of Oregon
Eugene, Oregon

CARNEGIE, ANDREW
Philanthropist
New York, N. Y.

CARY, C. P.
State Supt. of Public Instruction
Madison, Wis.

CAVANAUGH, REV. JOHN
President, University of Notre Dame
South Bend, Indiana

CHAPMAN, J. VIRGIL
State Supervisor of Rural Schools
Frankfort, Ky.

CHRISTIE, GEORGE I.
Superintendent, Agricultural Extension Department, Purdue University, Indiana
Lafayette, Indiana

CHURCH, EMMA M.
Director, Chicago School of Applied and Normal Art
Chicago, Ill.

CHURCHILL, J. A.
State Supt. of Public Instruction
Salem, Oregon

CLARK, EDITH K. O.,
State Supt. of Public Instruction
Cheyenne, Wyoming

CLARK, WALTER E.
President, University of Nevada
Reno, Nevada

Contributors and Reviewers

COBB, B. B.
Supt. of Schools
Waco, Texas

COLEMAN, WILLIAM H.
Formerly President, New York Drying and Heating Engineering Co.
New York, N. Y.

COLLINS, V. L.
Secretary, Princeton University
Princeton, N. J.

COOPER, ERMA ETHEL
University of Michigan
Ann Arbor, Michigan

COOPER, JAMES M.
Eye, Ear and Throat Specialist
Detroit, Michigan

CORSON, DAVID B.
Supt. of Schools
Newark, N. J.

CURRELL, WM. S.
President, University of South Carolina
Columbia, S. C.

DAU, W. H. T.
Professor of Theology, Concordia Theological Seminary
St. Louis, Mo.

DAY, JAMES R.
Chancellor, Syracuse University
Syracuse, N. Y.

DENNY, GEO. H.
President, University of Alabama
Tuscaloosa, Ala.

DEYOE, ALBERT M.
Ex-State Supt. of Public Instruction
Des Moines, Iowa

DOSTER, JAMES J.
Professor of Education, University of Alabama
Tuscaloosa, Ala.

DOUGHTY, W. F.
Ex-State Supt. of Public Instruction
Austin, Texas

DOWNES, FREDERICK E.
Supt. of Schools
Harrisburg, Pa.

DRAKE, E. H.
Supt. of Schools
Kalamazoo, Mich.

DUDGEON, R. B.
City Supt. of Schools
Madison, Wis.

EDSON, ANDREW W.
Associate Superintendent of Schools
New York, N. Y.

EDWARDS, HOWARD
President, Rhode Island State College
Kingston, R. I.

ELLIOTT, O. L.
Registrar Leland Stanford Junior University
Stanford University, Cal.

ELLIS, ALSTON
President, Ohio University
Athens, Ohio

ELLIS, HORACE
Ex-State Supt. of Public Instruction
Indianapolis, Indiana

EVANS, LAWTON B.
Supt. of Schools
Augusta, Ga.

FACKENTHAL, FRANK D.
Secretary, Columbia University
New York, N. Y.

FAUNCE, W. H. P.
President, Brown University
Providence, R. I.

FELL, THOMAS
President, St. John's College
Annapolis, Md.

FELMLEY, DAVID
President, State Normal School
Normal, Ill.

FRENCH, WALTER H.
Professor of Agricultural Education
Michigan Agricultural College
East Lansing, Michigan

FUTRALL, JOHN C.
President, University of Arkansas
Fayetteville, Arkansas

GASS, JNO. P.
Supt. of Schools
Sedalia, Mo.

GILBERT, WALTER M.
Secretary, Carnegie Institution of Washington
Washington, D. C.

GILL, CHAS. M.
Supt. of Schools
Quincy, Ill.

GITHENS, C. E.,
Supt. of Schools
Wheeling, W. Va.

GOBIN, HILLARY A.
Vice President, DePauw University
Greencastle, Indiana

GOODNOW, FRANK J.
President, Johns Hopkins University
Baltimore, Md.

GORTON, CHARLES E.
Supt. of Schools
Yonkers, Ohio

GROUT, D. A.
Supt. of Schools
Portland, Ore.

GUITTEAU, WILLIAM B.
Supt. of Schools
Toledo, Ohio

HADDOCK, FRANK D.
Former Assistant Commissioner of Education
San Juan, Porto Rico

HADLEY, ARTHUR T.
President, Yale University
New Haven, Conn.

HALL, FREDERIC A.
Chancellor, Washington University
St. Louis, Mo.

HARDING, H. P.
Supt. of Schools
Charlotte, N. C.

HARRIS, JAMES H.
Supt. of Schools
Dubuque, Iowa

HARRIS, T. H.
State Supt. of Public Education
Baton Rouge, La.

HART, HARRIS
State Supt. of Public Instruction
Richmond, Virginia

HART, JAMES N.
Dean, University of Maine
Orono, Maine

HARTWELL, S. O.
Supt. of Schools
St. Paul, Minn.

HAWKINS, WILSON
Supt. of Schools
Canton, Ohio

HEBARD, GRACE R.
Professor of Political Economy
University of Wyoming
Laramie, Wyoming

HERNDON, DALLAS T.
Secretary, Arkansas History Commission
Little Rock, Arkansas

HIMELICK, R. W.
Supt. of Schools
Fort Wayne, Indiana

HITT, JESSE M.
Librarian, Washington State Library
Olympia, Michigan

HOPE, FRANCIS
Secretary, California Development Board
Sacramento, Cal.

HOPKINS, ERNEST M.
President, Dartmouth College
Hanover, N. Hampshire

HOTCHKISS, H. V.
Supt. of Schools
Akron, Ohio

HUGHES, PERCY M.
Supt. of Schools
Syracuse, N. Y.

HUGHES, RAYMOND M.
President, Miami University
Oxford, Ohio

HUNTER, FRED M.
Supt. of Schools
Oakland, Cal.

JACKSON, B. B.
Supt. of Schools
Minneapolis, Minn.

JACKSON, CHARLES S.
Supt. of Schools,
Lynn, Mass.

JESSUP, WALTER A.
President, University of Iowa
Iowa City, Iowa

JOHNSON, T. E.
State Supt. of Public Instruction
Lansing, Michigan

JORDAN, JUNIUS
Supt. of Schools
Pine Bluff, Ark.

JOYNER, J. Y.
State Supt. of Public Instruction
Raleigh, N. C.

KENDALL, CALVIN N.
State Commissioner of Education
Trenton, N. J.

KERN, W. M.
Supt. of Schools,
Walla Walla, Wash.

KING, HENRY CHURCHILL
President, Oberlin College
Oberlin, Ohio

KING, W. P.
Supt. of Schools
Newport, Ky.

KIRKLAND, J. H.
Chancellor, Vanderbilt University
Nashville, Tenn.

Contributors and Reviewers

KLEIN SMID, RUFUS B. VON
President, University of Arizona
Tucson, Arizona

KNIGHT, J. E.
Supt. of Schools
Tampa, Fla.

MACBRIDE, THOMAS H.
Former President, University of Iowa
Iowa City, Iowa

MACLAURIN, RICHARD C.
President, Massachusetts Institute of Technology
Cambridge, Mass.

McCLINTON, J. W.
Supt. of Schools
Pueblo, Colo.

McDONALD, A. A.
Supt. of Schools
Sioux Falls, S. D.

McELROY, ROBERT M.
Professor of American History
Princeton University
Princeton, N. J.

McQUILKIN, D. E.
Supt. of Schools
Roanoke, Virginia

MADDOCK, W. E.
Supt. of Schools
Butte, Montana

MAYS, VERNON C.
Supt. of Public Schools
St. Joseph, Mo.

MEEK, CHAS. S.
Supt. of Schools
San Antonio, Texas

MEIKLEJOHN, ALEXANDER
President, Amherst College
Amherst, Mass.

MERRILL, JOSEPH F.
Secretary, University of Utah
Salt Lake City, Utah

MEZES, SIDNEY E.
President, College of the City of New York
New York, N. Y.

MILLER, FRANK W.
Supt. of Schools
Dayton, Ohio

MILLER, GURDON RANSON
Dean of the Senior College
State Teachers' College
Greeley, Colo.

MILLER, WALTER E.
Supt. of Schools
Knoxville, Tenn.

MITCHELL, SAMUEL C.
President, Delaware College
Newark, Delaware

MOTON, R. ROBERT
President, The Tuskegee Normal and Industrial Institute
Tuskegee Institute, Alabama

MOULTON, FOREST R.
Professor of Astronomy
University of Chicago

MUMFORD, FREDERICK B.
Dean, College of Agriculture
University of Missouri
Columbia, Mo.

MURLIN, LEMUEL H.
President, Boston University
Boston, Mass.

MURPHY, S. S.
Supt. of Schools
Mobile, Alabama

NELSON, AVEN
President, University of Wyoming
Laramie, Wyoming

NOBLE, MARCUS C. S.
Professor of Pedagogy, University of North Carolina
Chapel Hill, N. C.

NUNER, J. F.,
Supt. of Schools
South Bend, Indiana

O'DRISCOLL, D. M.
Principal, Memminger Normal School
Charleston, S. C.

OLIN, W. H.
Director, Agricultural Extension Department, University of Idaho
Moscow, Idaho

OLSON, ALMA LUISE
University of Chicago
Chicago, Ill.

PEARSON, F. B.
State Supt. of Public Instruction
Columbus, Ohio

PERKINS, GEORGE H.
Dean, Arts and Science Department
University of Vermont
Burlington, Vermont

PHILLIPS, J. H.
Supt. of Schools
Birmingham, Ala.

PIERCE, E. B.
Registrar, The University of Minnesota
Minneapolis, Minn.

PORTER, J. SHERMAN
Supt. of Schools
Lexington, Kentucky

POTTER, MILTON C.
Supt. of Schools
Milwaukee, Wis.

POWERS, JOSEPH N.
Chancellor, University of Mississippi
Oxford, Miss.

PRATT, ORVILLE C.
Supt. of Schools
Spokane, Wash.

PRESTON, MRS. JOSEPH CORLISS
State Supt. of Public Instruction
Olympia, Wash.

RAYMOND, H. M.,
Dean, Armour School of Technology
Chicago, Ill.

REDFIELD, ETHEL E.
State Supt. of Public Instruction
Boise, Idaho

REID, O. L.
Supt. of Schools
Louisville, Ky.

REURY, ANNA E.
Former Assistant Editor, "The Freeman,"
Kingston, N. Y.

RICE, MARTIN EVERETT
Associate Professor of Physics, University of Kansas
Lawrence, Kansas

ROBINSON, ALEXANDER
Supt. of Education, Province of British Columbia
Victoria, Canada

Contributors and Reviewers

ROBINSON, DOANE
Secretary and Superintendent, Department of History, South Dakota
Vermilion, S. D.

ROCHELEAU, L. OREM
Northwestern University
Evanston, Ill.

RONCOVIERI, ALFRED
Supt. of Schools
San Francisco, Cal.

SCOTT, C. J.
Supt. of Schools
Wilmington, Delaware

SCOTT, WILLIAM
Principal, Toronto Normal School
Toronto, Ontario

SEXTON, J. W.
Supt. of Schools
Lansing, Michigan

SHAEFFER, NATHAN C.
Late State Supt. of Public Instruction
Harrisburg, Pa.

SHAHAN, THOMAS J., DR.
Rector, Catholic University of America
Washington, D. C.

SHAWKEY, M. P.
State Supt. of Free Schools
Charleston, W. Va.

SHERRILL, S. W.
State Supt. of Public Instruction
Nashville, Tenn.

SHIELDS, ALBERT
Supt. of Schools
Los Angeles, Cal.

SIDERS, WALTER R.
Member Board of Trustees National Education Society
Pocatello, Idaho

SILLS, KENNETH C. M.
President, Bowdoin College
Brunswick, Maine

SIMS, JNO. F.
Principal, State Normal School
Stevens Point, Wis.

SISSON, EDWARD O.
President, University of Montana
Missoula, Montana

SLAGEL, ROBERT L.
President, University of South Dakota
Vermilion, S. D.

SMITH, ERNEST A.
Supt. of Schools
Salt Lake City, Utah

SMITH, PAYSON
State Commissioner of Education
Boston, Mass.

SMITH, SHIRLEY W.
Secretary, University of Michigan
Ann Arbor, Michigan

SPARD, A. R.
State Commissioner of Education
Dover, Delaware

STABLETON, J. K.
City Supt. of Schools
Bloomington, Ill.

STEVENS, E. B.
Secretary, University of Washington
Seattle, Washington

STONE, WINTHROP E.
President, Purdue University
Lafayette, Indiana

STOUT, A. J.
Supt. of Schools
Topeka, Kansas

STRONG, FRANK
President, University of Kansas
Lawrence, Kansas

ST. GEORGE, IDA
Boston University
Boston, Mass.

THOMAS, AUGUSTUS O.
State Supt. of Public Schools
Augusta, Maine

THOMPSON, W. O.
President, The Ohio State University
Columbus, Ohio

THORNBURG, Z. C.
Supt. of Schools
Des Moines, Iowa

TIGHE, R. J.
Supt. of Schools
El Paso, Texas

TINKER, B. W.
Supt. of Schools
Waterbury, Conn.

TRIPLETT, H. F.
Supt. of Schools
Beaumont, Texas

TRUMPER, MAY
State Supt. of Public Instruction
Helena, Mont.

TUTHILL, JAMES E.
Professor of History and Political Economy, University of Kentucky
Lexington, Ky.

TYLER, LYON G.
President, College of William and Mary
Williamsburg, Va.

UPHAM, WARREN
Secretary and Librarian, Minnesota Historical Society
St. Paul, Minn.

VINSON, ROBERT E.
President, University of Texas
Austin, Texas

WAGNER, J. HOWARD
State Supt. of Public Instruction
Santa Fe, New Mexico

WALSH, REV. MATTHEW J.
Vice-President, University of Notre Dame
South Bend, Indiana

WARREN, GEORGE F.
Professor of Farm Management and Farm Crops, Cornell University
Ithaca, N. Y.

WEAVER, THOMAS S.
Supt. of Schools
Hartford, Conn.

WEBB, WESLEY
Corresponding Secretary, Delaware State Board of Agriculture
Dover, Delaware

WEBER, H. C.
Supt. of Schools
Nashville, Tenn.

WHEELER, BENJAMIN IDE
President, University of California
Berkeley, Cal.

WHITE, MARCUS
Principal, State Normal Training School
New Britain, Conn.

WHITNEY, O. C.
Supt. of Schools
Bellingham, Wash.

WIDTSOE, JOHN A.
President, University of Utah
Salt Lake City, Utah

WILLIAMS, ARTHUR
Professor of Physics and Political Science, Florida State College for Women
Tallahassee, Fla.

WILSON, ROBERT H.
State Supt. of Public Instruction
Oklahoma City, Oklahoma

WINDER, CHAS. H.
Supt. of Schools
Chattanooga, Tenn.

WIRT, WILLIAM A.
Supt. of Schools
Gary, Indiana

WITHERS, JNO. W.
Supt. of Schools
St. Louis, Mo.

WOFTER, THOMAS J.
Director, School of Education, University of Georgia
Athens, Georgia

WOOD, WILL G.
Supt. of Public Instruction
Sacramento, Cal.

WORST, JOHN H.
Former President, North Dakota Agricultural College
Agricultural College, N. D.

WORTHEN, THOMAS W. D.
Cheney Professor of Mathematics Emeritus, Dartmouth College
Hanover, New Hampshire

YOUNG, ABRAM VAN EPPS
Professor of Chemistry
Northwestern University
Evanston, Ill.

YOUNG, FREDERIC G.
Professor of Economics and Sociology, University of Oregon
Eugene, Oregon

ZEISER, H. H.
Supt. of Schools
Wilkes-Barre, Pa.

DEPARTMENTS

Anthropology
Art
Agriculture
Architecture
Astronomy
Biography
Botany
Business and Finance
Chemistry
Civil Government
Domestic Science
Drugs and Medicines
Economics
Education
Ethics
Games and Plays
Geography
Geology

History
Horticulture
Language and Literature
Mathematics
Mechanic Arts
Military
Music
Mythology
Navy
Philosophy
Physical Culture
Physics
Physiology
Psychology
Religion
Sanitation
Transportation and Communication
Zoology

SCHEME OF PRONUNCIATION

The pronunciation of words is indicated by the use of phonetic spelling.

In an accented syllable ending in a vowel the vowel is long, as the *o* in *abdo' men*. In a syllable ending in a consonant the preceding vowel is short unless otherwise indicated.

Broad *a* is indicated by *ah*, soft *g* by *j*, soft *c* by *s* and hard *s* by *z*. An *e* at the end of a syllable indicates that the vowel preceding the consonant in the syllable is long, as Bainbridge, *Bane' brij*. *Ch* is soft, as in chess, unless marked *k*. *Y* following a consonant at the end of a word in the pronunciation indicates short *i*, as in Disraeli, *Diz ra' ly*.

The French *n*, pronounced nearly like *ng*, is indicated by the use of body type, as Blanc, *Blah*n. German *ch*, *ü* and *ö* are indicated by their nearest English equivalents.

Two accent marks are used; the single mark indicates the primary and the double mark the secondary.

THE HOME AND SCHOOL REFERENCE WORK

A

AARD'-VARK," a family of curious animals found in many parts of Africa and belonging to the group of Mammals known as the Fodientia, or Diggers. The commonest, the Cape aard-vark, was once classed with the anteaters, but has a heavier body, stouter limbs, longer ears, a more intelligent expression and a full set of teeth; in habits, however, it resembles them closely. The largest sometimes grows to be fully six feet in length and in shape of body resembles a thin-haired, yellowish bear; the tail, however, is thick and strong and not at all bearlike. The burrows which the aard-varks construct are found in both northern and southern Africa and in Europe, where the animal no longer exists. The natives of Africa hunt the aard-vark for its hide and have learned to seek for it near the great hills of the ants and the termites, where the animal nightly searches for its food.

Aa'ron, the elder brother of Moses and the first high priest among the Israelites. In the work of delivering the people from bondage, Aaron, though inferior to Moses, had much power and influence, being the spokesman of his brother before Pharaoh. In two instances Aaron fell into transgression: when he yielded to the people's demand for a molten image, while Moses was on Mt. Sinai; and when he, with Moses, showed a lack of faith during the tumult in the Desert of Zin, on account of lack of water (*Num. xx, 1-13*). His death occurred in the last year of the sojourn in the wilderness, when he was 123 years old, and he was buried on Mt. Hor.

Abacus, *Ab' a kus,* the classic name for what is known in schools as a numeral frame, a device for counting by means of beads strung on parallel wires, on which they are easily moved. This was the reckoning machine in use among the Greeks and Romans, and it is employed to this day by the Persians and Chinese, who show remarkable skill in its use.

Ab'bey, Edwin Austin (1852-1911), a distinguished American painter and illustrator, born in Philadelphia of an artistic family. He studied for a time in the Pennsylvania Academy of Fine Arts, after which he worked for a time in New York City. In 1878 he removed to England; and, although he spent the remainder of his life there, he never became a citizen. His rise to power and fame was rapid, but sure; each product of his art marked a step in advance of its predecessors and his popularity was great. He is said to have been one of the most lovable of men, the soul of generosity, with a keen sympathy and enthusiasm and an ardent democracy. He became a member of the National Academy of New York, of the English Royal Academy, and a Chevalier of the Legion of Honor. From magazine illustration he went to painting and mural decoration, and in every field of endeavor attained conspicuous success. He was one of America's foremost colorists, greatest illustrators, best draughtsman and most poetic painters of medieval subjects of his time, and one of the most intellectual painters America has produced. His colonial and Elizabethan subjects are unique in vividness and picturesqueness, and charm by their richness of detail.

Of his illustrations, those of Herrick's poems and the plays of Shakespeare are the most important. Also famous are the illustrations of Goldsmith's *She Stoops to Conquer, Old Songs* and *Who is Sylvia?* Mention should be made of *A May-Day Morning, Fiametta's Song, Crusaders Sighting Jerusalem* and *Richard, Duke of Gloucester, and the Lady Anne.* Abbey's greatest works are *The Coronation of Edward VII,* painted by "command" of the King, and the two important series of mural decorations—*the Quest of the Holy Grail* in the Boston Public Library and the eight lunettes for the State Capitol of Pennsylvania.

Ab'bot, the title of a prelate in the Roman Catholic Church who governs a convent or monastery. Originally the abbots were taken from among the laymen, but in the 17th century priests were selected for abbots by the Western Church, and the custom has continued to the present time. In power and authority abbots rank next to bishops. They are elected by the assembly of monks, and the election is confirmed by the pope or the bishop who has control over the monasteries.

Abbotsford, formerly the country home of Sir Walter Scott, is situated on the south bank of the Tweed, 28 m. s.e. of Edinburgh, Scotland, and near Melrose Abbey. Scott purchased the place in 1811 and named it Abbotsford because it was near a ford that was formerly used by the abbots of Melrose. Amid the beautiful surroundings which the site affords, the poet erected his home, beginning with a small villa which forms the western wing of the present structure. Additions were made to this villa from time to time embodying those features and ancient works of Scottish architecture which Scott loved, forming a structure which in its entirety is so picturesque that it has aptly been called "a romance in stone and lime."

Ab'bott, Jacob (1803-1879), educator and writer of popular books for the young, born at Hallowell, Me. At the age of 17 he graduated at Bowdoin College and later studied in Andover Theological Seminary. During the years 1825-29 he was professor of mathematics at Amherst College, removing from here to Roxbury, Mass., where he held a Congregational pastorate and gave much time to literary work. In all, his writings fill 200 volumes. Many of the great rulers of the world, as well as characters of American history have been treated by him in brief biographies for young people. Among the best known of his works are the *Rollo Books,* the *Franconia Stories* and the *Young Christian.*

Abbott, Sir John J. C. (1821-1893), a Canadian barrister and statesman, born at St. Andrews, Quebec, and educated at McGill University. On completing his education he began the practice of law. He was for ten years dean of the faculty of law at McGill and for a time a director of the Bank of Montreal. In 1887 he was called to the Senate and the following year was sent by the government to Australia to improve trade relations. In 1891 he became premier of Canada. He was twice mayor of Montreal and was an authority on banking and commerce.

Abbott, John Stevens Cabot (1805-1877), historian, Congregational minister, brother of Jacob Abbott, born at Brunswick, Me. In 1825 he graduated at Bowdoin College, and subsequently pursued theological studies which led to the ministry. Retiring from this field he gave his attention to literature. Among his writings are *History of the Civil War, Lives of the Presidents, History of Napoleon I, The French Revolution of 1789, The History of Frederick the Great, Marie Antoinette* and *Josephine.*

Abbott, Lyman (1835-), editor and clergyman, son of Jacob Abbott, born at Roxbury, Mass. He graduated at the University of the City of New York, completed a course in law in 1856 and was admitted to the bar, studied theology, and in 1860 was ordained in the Congregational Church. For five years he held a pastorate in Terre Haute, Ind. Subsequently he preached in the New England Church of New York City, resigning this work in 1869. From 1887

to 1899 he was pastor of Plymouth Church, Brooklyn, succeeding Henry Ward Beecher. He has edited successively the *Literary Record of Harper's Magazine,* the *Illustrated Christian Weekly,* the *Christian Union*—first in association with Henry Ward Beecher, later as editor-in-chief when the name was changed to *The Outlook.* He has been a moving force in the religious world and a conspicuous figure in journalism and has exercised wide influence through his books, his editorial comment and magazine articles. His published books include a *Life of Henry Ward Beecher, Evolution of Christianity, Results of Emancipation in the United States, Life and Literature of the Ancient Hebrews* and *The Rights of Man.*

Abbreviations, arbitrary signs or symbols or shortened forms of words used to save time and space. The substitution of the initial letter for the word is the most common form of abbreviating, but in some cases more than one letter is used. The abbreviations given below are in common use and one should be familiar with them.

A.B.....*Artium Baccalaureus,* Bachelor of Arts.
A.D.....*Anno Domino,* in the year of our Lord.
ad lib.....*ad libitum,* at pleasure.
Ala.....Alabama.
a.m.....*ante meridiem,* before noon.
A.M.....*Ars Magister,* Master of Arts.
Ariz.....Arizona.
Ark.....Arkansas.
ave.....avenue.
B.A.....*Baccalaureus Artium,* Bachelor of Arts.
B.C.....Before Christ; British Columbia.
B.D.....*Baccalaureus Divinitatis,* Bachelor of Divinity.
B.M.....*Baccalaureus Medicinæ,* Bachelor of Medicine.
B.Y.P.U....Baptist Young People's Union.
Cal.....California.
C.E.....Civil Engineer.
C.M.....common meter.
C.O.D.....cash (or collect) on delivery.
Colo.....Colorado.
Conn.....Connecticut.
cf.....compare.
Cr.....credit, creditor.
C.S.A.....Confederate States of America; Confederate States Army.
Dak.....Dakota.

D.C.....*da capo,* from the beginning—in music it means repeat; District of Columbia.
D.D.....*Divinitatis Doctor,* Doctor of Divinity.
Dec.....December.
deg.....degree; degrees.
Del.....Delaware.
Dept.....Department.
do.....*ditto,* the same.
Dr.....Doctor; debtor.
D.Sc.....Doctor of Science.
D.V.....*Deo volente,* God willing.
e.g.....*exempli gratia,* for example.
Esq.....Esquire.
et al.....*et alii,* and others.
etc. or &c....*et cetera,* and so forth.
Fahr. or F..Fahrenheit.
Fla.....Florida.
f.o.b.....free on board.
Ga.....Georgia.
G.A.R.....Grand Army of the Republic.
G.B.....Great Britain.
H.I.....Hawaiian Islands.
id.....*idem,* the same.
i.e.....*id est,* that is.
Ill.....Illinois.
Ind.....Indiana.
I.O.U.....I owe you.
Jr.....Junior.
Kan.....Kansas.
K.C.B.....Knight Commander of the Bath.
Ky.....Kentucky.
La.....Louisiana.
L.....Latin.
lb.....*libra* or *libræ,* pound or pounds.
L.I.....Long Island.
Lieut.....Lieutenant.
LL.B.....*Legum Baccalaureus,* Bachelor of Laws.
LL.D.....*Legum Doctor,* Doctor of Laws.
LL.M.....*Legum Magister,* Master of Laws.
M.A.....Master of Arts.
Mass.....Massachusetts.
Md.....Maryland.
M.D.....*Medicinæ Doctor,* Doctor of Medicine.
Mlle.....Mademoiselle.
Mdse.....merchandise.
Me.....Maine.
M.E.....Military or Mechanical Engineer.
Messrs.....Messieurs, Gentlemen.
m.....mile; miles.
Mex.....Mexico.
Minn.....Minnesota.
Miss.....Mississippi.
Mme.....*Madame,* Madam.
Mo.....Missouri.
Mont.....Montana.
M.P.....Member of Parliament.
Mr.....Mister.
Mrs.....Mistress.
M.S.....Master of Science.
MSS.....*manuscripta,* manuscripts.

N.B.....New Brunswick; *nota bene*, mark well, take notice.
N.C.....North Carolina.
N.E.....New England; northeast.
Neb.....Nebraska.
Nev.....Nevada.
N.H.....New Hampshire.
N.J.....New Jersey.
N.M.....New Mexico.
N.Y.....New York.
O.K.....all right; correct.
Okla.....Oklahoma.
Ore.....Oregon.
O.T.....Old Testament.
oz.....*onza*, ounce.
p.....page; participle.
Pa.....Pennsylvania.
Ph.B.....*Philosophiæ Baccalaureus*, Bachelor of Philosophy.
Ph.D.....*Philosophiæ Doctor*, Doctor of Philosophy.
P.I.....Philippine Islands.
p.m.....*post meridiem*, afternoon; evening.
Port.....Portugal or Portuguese.
pro tem.....*pro tempore*, for the time being.
Q.E.D.....*quod erat demonstrandum*, which was to be proved.
R.I.....Rhode Island.
R.R.....Railroad.
R.S.V.P....*Repondez s'il vous plait*, Answer, if you please.
Ry.....Railway.
S.A.....South America; South Australia.
S.C.....South Carolina.
S.D.....South Dakota.
Sr.....Senior.
syn.....synonym, synonymous.
Tenn.....Tennessee.
Ter.....Territory.
Tex.....Texas.
Thurs.....Thursday.
Ult.....*ultimo*, last; of the last month.
U.S.A.....United States of America; United States Army.
U.S.M.....United States mail; United States Marines.
U.S.N.....United States Navy.
U.S.S.....United States Ship.
Va.....Virginia.
viz.....*videlicet*, to wit, namely.
vs.....*versus*, against; *versiculo*, in such a verse.
Vt.....Vermont.
Wash.....Washington.
W.C.T.U...Woman's Christian Temperance Union.
Wis.....Wisconsin.
W.Va.....West Virginia.
Wyo.....Wyoming.
Xmas.....Christmas.
Y.M.C.A....Young Men's Christian Association.
Y.P.S.C.E...Young People's Society of Christian Endeavor.
Y.W.C.A...Young Women's Christian Association.

Abdo'men, in anatomy, the lower cavity of the trunk. It extends from the diaphragm above to the pelvic bones below, and contains the stomach, intestines, liver, spleen, kidneys and other vital organs. It is lined with a serous membrane, the peritoneum, which is also projected between the organs, and holds each in its place and at the same time allows freedom of movement. Inflammation of this membrane is known as the disease peritonitis.

The vital organs of the chest and abdomen are shown in the cut, the left-hand figure showing those in front, and the right-hand those in the back part of the cavity.

KEY TO CUT.

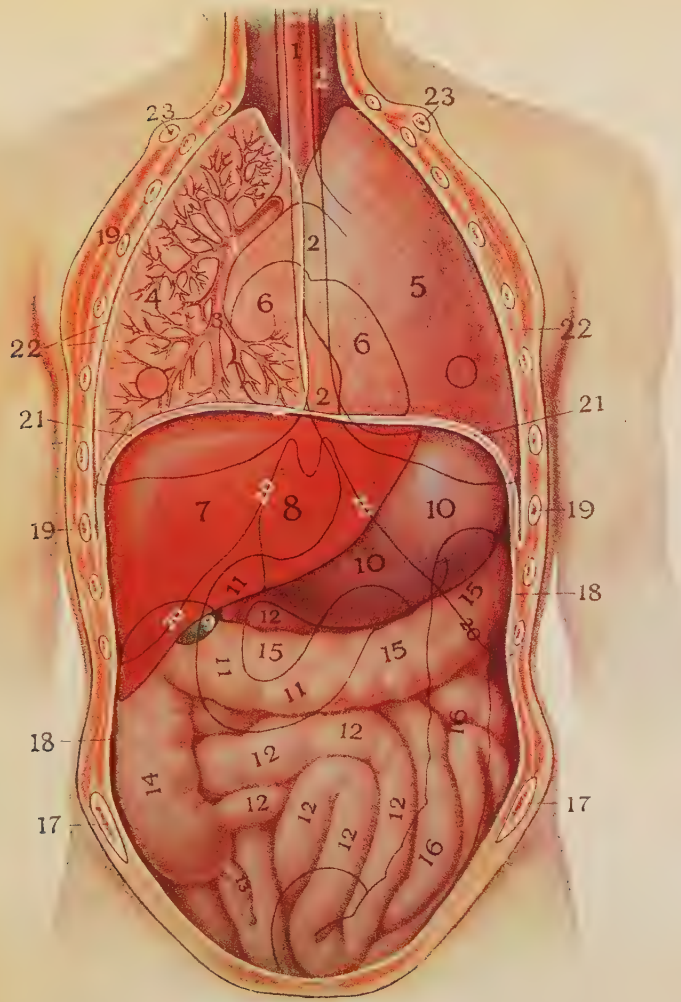
Left-Hand Figure.

1. Trachea. 2. Esophagus. 3. Bronchial Tubes. 4. Right Lung. 5. Left Lung. 6. Heart. 7. Right Lobe—Liver. 8. Left Lobe—Liver. 9. Gall Bladder. 10. Stomach. 11. Duodenum. 12. Small Intestine. 13. Appendix. 14. Ascending Colon. 15. Transverse Colon. 16. Descending Colon. 17. Pelvis. 18. Peritoneum. 19. Ribs. 20. Costal Arch. 21. Diaphragm. 22. Pleura. 23. Collar Bone.

Right-Hand Figure.

1. Trachea. 2. Right Lung. 3. Left Lung. 4. Descending Vena Cava. 5. Aorta. 6. Pulmonary Artery. 7. Pulmonary Veins. 8. Left Auricle—Heart. 9. Left Ventricle—Heart. 10. Right Ventricle—Heart. 11. Right Auricle—Heart. 12. Diaphragm. 13. Ascending Vena Cava. 14-15. Renal Capsules. 16. Right Kidney. 17. Left Kidney. 18. Pancreas. 19. Spleen. 20. Stomach. 21. Duodenum. 22. Costal Arch. 23-24. Ureters. 25. Common Iliac Vein. 26. Common Iliac Artery. 27. Bladder.

Abdul-Hamid II, *Ahb" dul-Ha meed'* (1842-1918), Sultan of Turkey. He was supposed to be of liberal principles at first, but the troubled state of the empire and his losses of territory led him to adopt a reactionary policy. In 1877 occurred the disastrous war with Russia, and Turkey might have been overthrown had not the other powers of Europe interfered in the negotiations for peace between the two countries. He lost all claim to Bosnia, Bulgaria, Herzegovina, Montenegro, Roumania and Servia, and he had to promise reform in his treatment of his Christian subjects. This promise



Copyright 1912, H. M. Dixon

ABDOMEN AND CHEST

he never kept, and the policy from that time forth was to play the European nations against each other. In 1908 a party for reform within the country became so strong that he was forced to grant a constitution. He was deposed in 1909 and succeeded by his brother, Mohammed V. See TURKEY, subhead *History*.

A'bel. See CAIN AND ABEL.

Ab'elard, Pierre, *Pe"er'*, (1079-1142), a French scholar, theologian and philosopher. At the age of 20 he went to Paris and a few years later he established a school of philosophy, which was attended by students many of whom afterwards attained eminence. The love story of Abelard and Heloise, a beautiful young niece of Fulbert, canon of Notre Dame, who was a pupil of the school, is one of the best-known episodes of literary history. Abelard entered a monastery at St. Denis and afterwards became a lecturer on religious subjects, but was an object of intense jealousy among the monks. In 1121, at a council held at Soisssons, his opinions were condemned as heretical, and shortly afterwards he retired to Nogent-on-the-Seine and built a chapel which was called Paraclete, or Comforter. Shortly before his death the Pope placed upon him the ban of perpetual silence by reason of his heretical utterances. A collection of the writings of Abelard was made in the early part of the 17th century and published at Paris, but his complete works remained unpublished until the middle of the 19th century. Abelard's importance rests upon his having given to ecclesiastical doctrine a more rational form of philosophical reasoning; in his having propounded the works of Aristotle and forced a recognition of their supreme worth; and in the new emphasis which he gave to ethics.

Abercrombie, *Ab' er krum" by,* **James** (1706-1781), British general, born in Scotland. During the French and Indian War he commanded the British forces in America, in 1758. His attack on Ticonderoga resulted in failure and a loss to the British of 2000 killed and wounded. After his return to England he was elected to Parliament.

Ab"erdeen', a royal burgh of Scotland, the capital of Aberdeenshire and the fourth largest city of Scotland. The city is situated on a bay of the North Sea and lies about 130 m. n.e. of Edinburgh. Granite has been used for the construction of the majority of the buildings, and after a heavy rainfall the gleaming white of the edifices bears evidence to the fact that Aberdeen well merits its poetic, popular name of the "Silver City by the Sea." The principal buildings are the imposing municipal and county buildings, the Trades' Hall, the Music Hall buildings, Marischal College (designed by Alexander Mackenzie), Aberdeen University, the Cathedral of St. Machar, the Roman Catholic and numerous other churches. Among the four bridges crossing the River Dee is one of stone, constructed in 1527. The manufactures are important and consist mainly of granite cutting, cotton spinning, the manufacture of linen, cotton and woolen goods, the manufacture of paper, iron founding and shipbuilding. The imports include barley, maize, oats, sugar, timber, flaxseed, flour and wheat meal; the exports consist of coal and stone products, cloth manufactures, fish and spirits. In the 12th century Aberdeen was an important town. It was burned by King Edward III, of England, in 1336, but was rapidly rebuilt and named New Aberdeen. Population in 1919, estimated at 165,000.

Aberdeen, John Campbell Gordon, SEVENTH EARL OF (1847-), an English statesman. He received his education at St. Andrews University and at Oxford, and on the death of his brother, in 1870, succeeded to the title and estate. At the beginning of his political career his leaning was to the Conservative side; but later he forsook that party and rallied to the support of Gladstone, who appointed him lord lieutenant of Ireland. In 1893 he was appointed governor-general of Canada, a post which he held with popular favor for five years.

Aberdeen, S. D., the county seat of Brown Co., 280 m. w. of Minneapolis, Minn., and on the Chicago, Milwaukee & St. Paul, the Chicago & North Western and other railways. It is an important railway junction, also a manufacturing and distributing center for the surrounding county. A state normal school and a state industrial school are also located here. Population in 1920. U. S. census, 14,537.

Aberdeen, Wash., a city of Chehalis Co., about 12 m. by rail w. of Montesano and 50 m. w. of Olympia, at the head of Grays Harbor. Transportation is furnished by a branch of the Northern Pacific Railroad. It is in the midst of vast timber lands, and lumbering is an important industry. In the city are several sawmills, woodworking factories and machine shops. Other important industries are fruit growing and dairying, shipbuilding, fish canning, and iron foundries. Population in 1920, 15,337.

Ab"erra'tion, in astronomy, a slight periodic change in the apparent position of the heavenly bodies, caused by the variations in the light and in the position of the observer. Aberration is of three kinds: planetary, when due to the motion of a planet in its orbit; annual, when due to the motion of the earth in its orbit as well as to the change in light; and diurnal, when due to the rotation of the earth upon its axis and to the motion of light.

In physics, aberration refers to the indistinctness of outline of an image, caused by the rays of light tending to meet at different points, called foci. Such aberration may be caused by a spherical mirror, unless the mirror is very small in comparison with the size of the sphere of which it would be a part. The reflected rays neither meet at nor extend from a given point, but from a number of points which form a curve. The effect thus produced is spoken of as a spherical aberration by reflection. It is avoided by use of a mirror of slight curvature or by certain methods of polishing. Spherical aberration by refraction, or bending of the light rays, is due to their unequal refraction. This is observed in a lens which is relatively narrow for its height. Such a lens forms an indistinct image because the rays of light which pass through it do not all meet at the same focus, and distinctness requires that the rays meet at a single point. To remedy this defect lenses of ellipselike form are occasionally used. In theory, such a lens produces no aberration, but since it is almost impossible to grind an accurately elliptical lens it is more practical to *reduce* the aberration than to attempt to remove it. The use of a diaphragm, which shuts out a part of the light, and the proper combination in a lens of substances of differing refractive powers are the ordinary remedies employed. A lens or combination of lenses free from spherical aberration is said to be aplanatic.

Chromatic aberration is also a defect of lenses due to the unequal refracting power of the different colors. It is especially noticeable if a lens is covered, except for a narrow rim about the margin, and a sunbeam is allowed to pass through this rim. If a lens is thought of as a series of small prisms whose minute faces form the surface of the lens, the phenomenon is easily understood. Since red is the least refrangible of the colors, an object seen through such a lens has frequently a border of red. Lenses are made achromatic, or capable of refracting light without separating the colors, by the use of two substances of unequal dispersive or refractive power. A lens constructed by the combination of a convex lens of crown glass united with a concave lens of flint glass constitutes an achromatic lens. See LENS.

Ab'ilene, Tex., a city and the county seat of Taylor Co., 160 m. s. w. of Ft. Worth, on the Texas & Pacific and other railroads. It is the center of a farming district, of which cotton growing and stock raising are important pursuits. It contains cotton gins, cotton compresses, cottonseed-oil mills, flour mills, grain elevators and manufactories of harness, saddlery, ice and lumber. The

educational advantages are good and include a flourishing Baptist college. There is a state epileptic colony here. Population in 1920, 10,274.

Abolitionists. See POLITICAL PARTIES IN THE UNITED STATES.

A'braham (father of a multitude), the greatest of the Hebrew patriarchs and the father of the Hebrew race. He was the son of Terah, who was the tenth in lineal descent from Shem, and was a native of Ur of the Chaldees. Here he married Sarai, afterwards Sarah. Originally called Abram, he received the name Abraham in recognition of the covenant established between himself and Jehovah, when he was 99 years old, that he was to be the father of many nations (*Gen. xvii*). Earlier in his career God had commanded Abraham to leave his native place of Ur, about 2000 B. C., and journey southward. After several years of wandering, he settled finally in Beer-sheba, where the last 75 years of his life were spent and where his son Isaac was born. He died "in a good old age," being 175 years old, and was buried in the field of Machpelah, the burying ground of his descendants. See ISAAC.

Abraham, Plains of. See QUEBEC, BATTLE OF.

Abra'sives, those substances which are principally used for polishing wood, metals and stone by grinding and rubbing. The most common abrasives are the natural ones: corundum, emery, quartz, sand, garnets and those varieties of rock used for grindstones and whetstones. Carborundum, a product of the electric furnace, by reason of its extreme hardness, its many cutting edges and its crystalline structure, makes an excellent abrasive. It can be obtained in many forms and grades of fineness. Polishing powders composed of pumice, tripoli and infusorial earths are used, often mixed with glue and spread on belts and wheels. The coarser and harder abrasives are used for cutting, and the finer, for polishing. The grindstone and emery wheel are the most common forms in which abrasives are used. Sandpaper, emery paper, emery cloth and carborundum cloth, in sheets of the fineness required, are procurable from dealers generally. Soaps designed for scouring, scrubbing and polishing contain abrasives in varying proportion and degrees of fineness.

Abruzzi, Prince Luigi Amedeo, *Ah broot' se, Loo e' je Ah ma dah' o,* OF SAVOY-AOSTA, DUKE OF (1873-), Italian traveler and Arctic explorer. He studied in the Naval College at Leghorn and was made captain of the Italian navy. In 1900 he made his famous voyage toward the North Pole, attaining the latitude 86° 33', the highest that had been reached up to that time. This royal personage, the son of a former king of Spain, was not only a successful explorer, but a pleasing writer, and published two volumes of notes made during his travels. America takes a kindly interest in his history since only the urgent remonstrance of the Italian Royal family prevented his marriage to an American lady. He commanded the Italian fleet in the World War.

Ab'salom (father of peace), the third son of David. Possessed of grace and beauty, yet vain and ambitious, he engaged in a rebellion against his father David, but was defeated and slain. David's tenderness and sorrow for his erring son are expressed in his touching lamentation in *Second Samuel xviii, 33.*

Absinthe, *Ab'sinthe",* an intoxicating, emerald-colored drink prepared from the tops and leaves of a variety of wormwood belonging to the Composite Family. The drink was once given as a stimulating medicine or as a narcotic, but its effect was to create an appetite for the drink and to produce finally a diseased condition comparable to alcoholism. The drink, which is made by softening the leaves and stems of the plants and distilling the resulting liquid with spicy oils, is prepared chiefly in Neuchâtel, Switzerland, and Bordeaux, France. Absinthe was first made by the French in 1844 as a cure for fever, but the evils of absinthe drinking became so great that its use was forbidden soldiers and sailors. Belgium has also made an enactment

which forbids its manufacture, exportation and sale.

Absorp'tion, in physiology, the passage of digested food from the alimentary tract, through its walls, into the blood or lymph. Absorption through the stomach is slight. The small intestine is especially constructed for the absorptive process, and in it the greater part of absorption takes place. According to best authorities, the process is more than the simple passage of a fluid through a membrane; it is carried on actively by the living cells, which constitute the inner membrane of the lining of the intestine. The principal organs of absorption are the lymphatics, lacteals and blood vessels. See LACTEALS; LYMPHATICS.

Abt, Franz, *Ahpt, Frahnts,* (1819-1885), German poet and musician. In 1852 he became musical director at the court theater at Brunswick, and in 1872 made a tour of Canada and the United States. He was noted as a writer of songs, of which he published many hundred, the best known being *When the Swallows Homeward Fly.*

Aby'dos, one of the most ancient cities of Egypt, is famous for the ruins of its temples and as the burial place of the early kings of Egypt. Nine or ten temples were built successively in this city from 5500 B. C. to 500 B. C. Here were found the ivory carvings, the glazed figures and tiles showing the splendid work of the first dynasty, a vase of Menes and an ivory statuette of Cheops.

Thothmes, Rameses II and Seti I all reared temples in this city. The temple of Seti I, known as the Great Temple of Abydos, was built on entirely new ground, and its principal object was the adoration of the early kings. The temple of Rameses II, which is near that of Seti I, is smaller and simpler in plan, but it is noted for the series of historical scenes on the outside.

The Royal Tombs are placed about a mile from the city, on the desert. The contents of the tombs have been nearly destroyed by plunderers. Enough has been left, however, to show that the mummies were buried with rich jewelry; that a large number of vases of valuable stones stood about the body; that jars of wine and other supplies were placed in the storerooms; and upon tablets of ivory and of ebony were engraved yearly records of the chief events of the king's reign. Private persons were buried here as early as the first dynasty, and this city was used as a burial place until the Romans conquered Egypt.

Abydos, an ancient city of Asia Minor, was situated at the narrowest part of the Hellespont. Here Xerxes crossed the strait on a bridge of boats in 480 B. C., and Alexander crossed into the Persian territory from the same point in 334 B. C. We are told that Leander swam nightly to Hero from Abydos to Sestos, a distance of about a mile. To prove the possibility of this feat, Lord Byron swam across.

Ab"yssin'ia, formerly Ethiopia, a kingdom of northeastern Africa, bounded upon the n. by Erythrea, on the e. by the Somaliland, on the s. by British East Africa and on the w. by the Anglo-Egyptian Sudan. Physically, Abyssinia is chiefly a region of plateaus rising by gradual terraces at the west, but descending abruptly on the east to the low plains that skirt the Red Sea. The highlands consist of fantastic peaks evidently formed by some violent volcanic action long since become quiet. The erosion of the lava has left wide gorges in which vegetation is dense and almost tropical in character. The plains are open downs cut by large rivers, most of which seek the Nile, while the highest peaks are almost barren. The climate is both tropical and temperate, for, though the country lies wholly within the tropics, its elevation renders some sections cool or even cold. On the whole the climate is healthful and agreeable. Because of its varied climate its flora is also varied. In the valleys are found the date palm, mimosa, olive, sycamore, myrrh, fig, orange, lime, pomegranate, banana, indigo, cotton and sugar cane; on the highlands are forests of pine and much other valuable timber. Abyssinia is the home of many wild animals and

birds of beautiful plumage. The elephant, rhinoceros, leopard, giraffe, wildbeeste, zebra, lynx, wolf, jackal, hippopotamus, crocodile, antelope, civet, monkey and many Rodents inhabit the swamps and forests, while in the mountains and valleys the heron, parrot, humming bird, eagle, vulture, ostrich, duck, pigeon, curlew and other birds are found.

The chief industry is agriculture, since the soil is fertile; however, it is only recently that modern agricultural implements have been in use. Cereals and fruits are the principal products. Mining is carried on in the mountains, where deposits of iron, silver, salt and coal are found. Recently gold has been found in the river courses and promises to be a great source of wealth. The people of Abyssinia are of Hamitic and Semitic origin. The various tribes differ but little in habits and in physical appearance. They are of medium stature, are graceful and have regular features. In general they are ignorant, superstitious and eager for warfare. The official language is a survival of the old Ethiop tongue and is called Amharic; the various tribes have, however, their own dialects. Christianity was introduced by Constantine and is said to be the religion of the country, though as practiced it bears little resemblance to the true Christian faith.

The government is an absolute monarchy whose head is called the "king of kings." The country is divided into three divisions, ruled by petty princes who are placed in power or deposed by the king. The history of Abyssinia dates back to the earliest records. It is said to be the land of the Queen of Sheba, from whom the present ruler claims to be able to trace his descent. The Abyssinians have been brought into contact with their British, Italian and French neighbors through boundary conflicts, but the country continues to be wholly independent. Its area is about 350,000 sq. m.; its population, about 8,000,000.

Acacia, *A ka' sha,* a tree or shrub of the Pulse, or Pea, Family, of which nine or ten species are known in the United States, though none is native north of Texas. They grow in profusion in Australia, but have been brought into Europe and into northern United States as ornamental trees. The trees are mostly low, though some attain a height of from 20 to 30 ft., and are often thorny. The leaves consist of small leaflets arranged in featherlike order along the midrib, or are only undeveloped, flattened stems taking the place of leaves. They are exceedingly sensitive to light and dark, often folding together in sleep if a cloud obscures the sun for several minutes. The flowers, which are very fragrant, are small, grow in thick clusters and present a brightly-colored appearance due to the projection of the stamens beyond the enveloping calyx. The fruit is a long, twisted pod having a sweet pulp.

The acacia produces gum arabic, a liquid which oozes from the stem when an incision has been made and which hardens in the air. Catechu, an extract from the heartwood of some East Indian acacias, is used as a medicine. The bark of many species contains so much tannin that their culture in the United States is urged to supply tanneries (See LEATHER).

The honey locust, sometimes called rose acacia, is an allied species, common in Pennsylvania and south. The shittah tree, mentioned in the Old Testament, from whose wood, called shittim, the tables, altars, Ark, etc., of the Temple at Jerusalem were made, is a species of acacia having a hard, fine-grained wood of yellowish-brown color. It is a favorite wood of Eastern cabinetmakers.

Acad'emy, the name applied to a school conducted by Plato in a pleasure garden about a mile outside of Athens. This ground was supposed to have been the property of Academus, an ancient Attic hero. It was on the River Cephissus, had been walled in by Hipparchus, adorned with walks, groves and fountains by Cimon, and was open to the public. The word is now commonly used with two quite different meanings. An academy may be a school for pupils of high-school age, pupils who have finished the work of primary and grammar schools,

but are not yet prepared for entrance at a college or university. For many years these academies, usually supported by some religious denomination, were the only schools in the United States where students might obtain such education, but as the public high schools increased in numbers and in efficiency the need for academics lessened. Educators felt that the public schools by permitting a closer companionship between the students were more in accordance with our American ideals. An academy may be a society of scholars, scientists or others, who seek, without hope of reward, to acquire and disseminate knowledge beneficial to mankind. Moreover, the word may be used as the name of a building where pupils assemble for instruction, where scholars meet, or where art treasures and other collections are preserved. In literature "The Academy" means the French Academy, established in 1635 by Richelieu, which is the most noted of all the world's societies of this name. It still exists very much as it was first organized. There are but 40 members, known as the 40 immortals, and to be included among this number is one of the greatest honors that a literary person can receive. In art "The Academy" refers to the Royal Academy of London, founded by George III in 1768. The American Philosophical Society, organized in Philadelphia in 1743, is the oldest of American academies. Many such organizations have since been established throughout the world. Some of these are national in scope, like the Smithsonian Institution at Washington. Some have state significance and others are merely local organizations, but all exist for the purpose of advancing science, literature and art.

Acadia, *A ka'di a,* or **Acadie,** *A"ka"de',* the name given by the first French settlers to a province lying between the parallels 40° and 46° north latitude, in North America, consisting of what is now Nova Scotia, New Brunswick and a part of Maine. It was settled by De Monts in 1604. Throughout the French tenure the New England colonists made attempts to obtain possession of the country and in 1621 Sir William Alexander obtained a grant of Acadia, which had been renamed Nova Scotia, from James I of England. In 1713 by the terms of the Treaty of Utrecht, France gave up its claims to the country except to Cape Breton, or Isle Royale. French influence continued to predominate, however, to such an extent that the English Government in 1755 deported a large number of French Canadians and scattered them among the English colonists from Massachusetts to Georgia. Longfellow's poem *Evangeline* is founded upon an incident connected with the departure of the Acadians. By the terms of the Treaty of Paris in 1763 France resigned entire claim to the country.

Acanthus, *A kan'thus,* a classical, ornamental herb of the Acanthus Family. The leaves are broad and deeply cut and form the spreading, shrubby branches from which the design of the Corinthian capital is said to have been taken. The flower is irregular and dull-colored. The acanthus is common in southern Europe.

Accli"matiza'tion, the adapting of the plant or animal to climate to which it is not native. Many organisms are incapable of acclimation and perish if transported to a foreign environment, while others adapt themselves readily. Certain plants, such as fruits and potatoes and some cereals, are examples of acclimatization. However, some species exhibit a limited power of adaptability. Cases of partial acclimatization, in which the species maintains life but fails fully to develop, are numerous. Animals show great variability in power to adapt themselves to environment. Cats, dogs, mice and domestic fowls have a ready adaptability and thrive equally well in all climates where human life is possible. Most animals can be transported to climates which are not native to them if the change be made gradually, whereas sudden changes frequently result in death. Of all animals, man has the most ready adaptability to changes; yet he often falls a prey to fatal diseases when sudden changes are made. It is frequently found

necessary, in making a change from a hot to a cold climate, or vice versa, to immunize the system against certain diseases with the use of drugs.

Accor'dion, a box-shaped, musical wind instrument, from eight to twelve inches long and about four inches wide. It contains a series of metallic reeds which are set in vibration by air which passes through them from a bellows. The bellows is manipulated with the left hand, leaving the right hand free to operate the keyboard. Each key produces two notes, one when the air is expelled from the bellows, another when it is drawn in. See CONCERTINA.

Accu'mula"tor. See STORAGE BATTERY.

Acetanilid, *As"et an'il id,* a white powder made by uniting acetic acid and aniline. It is used medicinally to alleviate pain, but because of its poisonous character should be used only sparingly and under the advice of a physician. Acetanilid is frequently a constituent of headache powders and tablets. It is practically insoluble in water, so cannot be used hypodermically. It is odorless, slightly bitter to the taste and dissolves in alcohol and in ether.

Acetic, *A se'tik,* Acid, a complex acid of carbon, best known as vinegar, which is its diluted form. It is commonly produced by the oxidation of alcohol, assisted by a bacterium known as mother-of-vinegar. Another method of production consists in allowing alcohol to trickle over beechwood shavings. The bacteria in the air aid in its oxidation. Wines, beers and ciders which sour in the air have been acted upon by this same bacterium and partially turned to acetic acid.

Acetylene, *A set'i lene,* a colorless hydrocarbon gas found in small quantities by direct union in the electric arc; also when water is poured upon a mass of calcium carbide, acetylene is set free in large quantities. When generated in an apparatus properly constructed, and cooled, purified and mixed at the burner, with sufficient air to support combustion, a very beautiful light of great illuminating power is produced, by which even colors can be judged as well as in the sunlight. Acetylene is highly explosive when confined even in small quantities, particularly when mixed with air and ignited, or when subjected to sudden pressure. When prepared from the commercial calcium carbide, this gas is generally impure; the odor and the supposed poisonous properties are due largely to these impurities.

Acetylene is now chiefly used for lighting automobiles, railroad cars, churches, offices and public buildings. It is generated from automatic machines which mix water and the calcium carbide in suitable quantities. It is furnished in tanks under pressure, and in connection with oxygen under pressure in tanks, in a special form of blowpipe, it produces the oxy-acetylene flame, which is largely employed to weld steel, and for many minor purposes in working metals.

Calcium carbide is a hard, grayish, slaglike mass procurable commercially in lumps of varying sizes. It is produced by a mixture of pulverized limestone and coke fused in the intense heat of an electric furnace. Extensive factories for the making of it are located at Niagara Falls and Sault Ste. Marie, Mich., where water power is used to generate the high voltage required in these electric furnaces.

Achæans, *A ke' ans,* one of the four chief divisions of the ancient Greek peoples, according to legends descended from Achæus, grandson of Hellen. In the Homeric poems of 1000 B. C. the Achæans are the leading race in Greece, and they are represented as coming into the country about 1300 B. C.

THE ACHÆAN LEAGUE. The Achæans were unwarlike and somewhat lacking in enterprise, but they instituted one of the most remarkable federations in history before the formation of the American Union in 1789. As early as the Persian War there existed a confederacy of some sort in Achæa, but this was destroyed under Macedonian rule, and tyrants were set up in several Achæan cities. About 280 B. C. four small towns revived the ancient confederacy and drove out the tyrants. Soon the union embraced all Achæa. A constitution was

formed whereby the chief authority was placed in an Assembly, made up of all citizens who chose to attend. Each city had one vote. The Assembly was held in the small towns, meeting for three days at a time, twice a year. It chose a yearly Council of Ten, a Senate and a general (or president). This body raised federal taxes and armies and represented Achæa in all foreign relations, but each city had full control of all its own internal affairs. The constitution had two grave weaknesses. It made little use of representation, and all cities had one vote, regardless of size. The latter provision worked injustice to the more powerful cities.

In time, the league became the commanding power in Hellas, including all of the Peloponnesus except Sparta and Elis. In a conflict with Sparta the Achæan League was defeated, but the leader of the league refused to accept Sparta as head of the union, and sought the aid of Macedon. As a result, the federation became a protectorate of Macedonia, and in 146 B. C., with the rest of Greece, it fell under the power of Rome.

Achard, Franz Karl, *Ahk' ahrt, Frahnts Karl,* (1753-1821), a German naturalist and chemist who distinguished himself by the discovery of a new process for making beet sugar, to which is due the extensive manufacture of that article in modern times. He operated successfully a beet sugar factory under the auspices of the King of Prussia. Later he became director in the Berlin Academy of Sciences.

Achates, *A ka' teez,* a Trojan hero. He was so loyal a comrade of Æneas during his wanderings after his flight from Troy that *Fidus* (faithful) *Achates* has become proverbial. See ÆNEAS.

Achelous, *Ak"e lo'us,* (now called the *Aspro Potamo* or White River), the largest river in Greece. It rises on Mt. Pindus and falls into the Ionian Sea, in its southerly course dividing Ætolia from Acarnania. The god of this river was the offspring of the Sun and Earth.

Acheron, *Ak'e ron,* the former name of several rivers in Greece and Italy, of which that in Epirus, emptying into the Ionian Sea, near Parga, is best known. The name has been poetically identified as that of the muddy and bitter stream of the lower world, the river of "eternal woe," over which souls of the dead were first conveyed.

Achilles, *A kil' eez,* a mythological Greek hero, son of King Peleus and the ocean goddess, Thetis. Desirous of making him invulnerable, his mother dipped him in the Styx, after which only the heel by which she had held him was subject to wounds. He was educated by the Centaur Chiron, who fed him marrow from wild beasts. At the head of his famous Myrmidons he fought valiantly in the Trojan War, but when Agamemnon took from him his beautiful captive, Briseis, he sulkily withdrew. Only when his dear friend Patroclus was pierced dead by the spear of Hector did he return to battle; and then, donning an impenetrable armor which Vulcan had fashioned, Achilles avenged his friend by killing Hector. Achilles himself was soon after slain by Paris, who treacherously drove an arrow into his heel. See TROJAN WAR; MYRMIDONS.

Achilles, Tendon of. See TENDON.

Ac'id, a chemical compound containing a nonmetal and hydrogen, the latter being replaceable by a metal; when so replaced the resulting compound is a *salt.* Acids generally have a sour taste and the ability to redden blue vegetable dyes; they also dissolve zinc and other metals.

Many acids contain oxygen, and it was once supposed that this was a necessary constituent, hence oxygen was given a name meaning acid-producing. Later, however, compounds having acid properties but no oxygen were discovered, and this led to the further discovery that hydrogen is the essential factor. A system of suffixes and prefixes, which denote the proportion of oxygen contained, is in use among chemists in naming the acids and their resulting salts.

An acid may be liquid, solid or gaseous, but is ordinarily capable of being dissolved in water. Acetic acid, or vinegar, was the first acid known, and was found

in sour wine. During the period of the study of alchemy many other acids were discovered and their properties investigated. The most common and most important acids are nitric acid; sulphuric acid; carbonic acid; carbolic acid; hydrochloric, or muriatic, acid, found in the gastric juice; malic acid, in apples; lactic acid, in sour milk; citric acid, in lemons; tartaric acid, in grapes; cyanic acid, in peach pits and almonds; and formic acid in nettles.

ACONITE

Acis, *A'sis,* a handsome shepherd of Sicily, son of Faunus and a Naiad, and lover of Galatea. His rival, the Cyclops Polyphemus, chancing upon him and Galatea one day, uttered a roar of rage that shook the earth, and, snatching a rock from the side of Mt. Etna, crushed to death the unfortunate youth. Oozing from under the rock, his blood became a river which still bears his name.

Aconcagua, *Ah" kon kah' gua,* an extinct volcano of the Andes Mountains, located on the border of Argentina. It has an elevation of over 23,000 ft. and is considered the highest mountain in America. It was first ascended by Zurbriggen in 1897.

Aconite, *Ak'o nite,* a slender herb of the Crowfoot, or Buttercup, Family, and the producer of the drug known as aconite. The plant has long, drooping stems bearing coarsely-divided leaves, much like those of the buttercup. The flowers are purple and are surrounded by five green or brownish sepals, the upper one of which is hooded and gives to the plant the common name of monkshood. Underneath this hood two insignificant petals are concealed, and four, which are long and slender, extend from beneath it. The drug is derived from the root and leaves. It is a crystalline substance applied externally to produce numbness in cases of neuralgia, and internally, to allay fevers and inflammations, since it retards the action of the heart. In large doses aconite is a deadly poison.

Acre, *Ah'ker,* a seaport of Syria, situated a few miles north of Mt. Carmel, famed for its many sieges. Acre was known in Bible times as Accho, and in Roman times as Ptolemais. The Romans made it a colony. In 638 it was captured by the Arabs and in 1104 by the Crusaders; the Sultan Saladin recaptured it in 1187. In 1191 it was again in the possession of the Crusaders, under whom it became the seat of the Order of St. John, but in 1291 it fell into the hands of the Saracens, being the last stronghold of the Christians. The Turks stormed the town in 1517. Napoleon unsuccessfully besieged it in 1799. From 1832 until 1840 it was in the possession of Ibrahim Pasha, the son of the Egyptian viceroy, and in 1840 was captured by a combined English, Austrian and Turkish fleet.

Acrop'olis. See ATHENS, subhead *Age of Pericles.*

Actæon, *Ak te' on,* a bold hunter, who, according to mythology, was turned into a stag by Diana, whom he inadvertently saw bathing as he was roaming the

woods, one day. As he fled in horror, he was torn to pieces by his own dogs.

ACTÆON

Actinism, the science of the chemical changes which are effected by light. Rays of light of different color are known to cause differing chemical results. The red rays act slowly and are, in consequence, admitted to the dark room of the photographer, where they do not affect the sensitive plates. The violet rays act more rapidly and are of especial use in hastening chemical action and encouraging the germination of seeds and growth of plants. Other rays are made use of in medicine. The rays are admitted by means of glass of the desired color. See LIGHT.

Actium, *Ak' shi um,* the present **Akri,** a promontory on the western coast of northern Greece, memorable for the naval victory which Octavius (later the Emperor Augustus) gained here over Antony and Cleopatra, 31 B. C. This battle made Octavius sole master of the Roman world.

Acts of the Apostles, one of the books of the Bible, coming after the book of *John,* a history of the early Church, written by Luke, A. D. 81-96 (Bacon), though some authorities put the date twenty years earlier. It contains, among other things, the accounts of Pentecost, the establishing of the Church at Jerusalem, the spread of Christian teaching throughout Asia Minor and into Europe, the conversion of Saul of Tarsus, the Council at Jerusalem and the missionary journeys of Paul.

Adam and Eve, in the Scriptural account of the creation, the first man and woman. The story of Adam and Eve and of their descendants is chronicled in the first chapters of *Genesis.*

Ad'am, Græme Mercer (1839-), a Canadian author, born in Scotland. In 1858 he went to Canada, where he engaged in the publishing business, which he later carried into New York and which developed into the United States Book Company. Returning to Toronto in 1878, he entered upon an active literary career. Previously, in 1872, in cooperation with Goldwin Smith, he had founded the *Canadian Monthly,* which he edited from 1879 to 1883. Till 1892 he edited various other Canadian periodicals and wrote prolifically on educational subjects. He then became reader and literary adviser for the United States Book Company of New York, and in 1896 he removed to Chicago, where he edited *Self-Culture,* which he later accompanied on its removal to Akron, Ohio. After six years he returned to New York and there, among other works, he recently wrote a life of Gen. Robert E. Lee and one of Peter the Great.

Adam's Apple. See LARYNX.

Ad'ams, Charles Francis (1807-1886), statesman and author, son of John Quincy Adams. His early years were spent abroad during his father's service as minister to Russia and England, but

he returned to enter Harvard College, from which he graduated in 1825. He then studied law in the office of Daniel Webster, and was admitted to the bar in 1828. After serving in the Massachusetts Legislature as a Whig from 1841 to 1846, he joined the Free-Soil Party in 1848 and was its unsuccessful candidate for vice-president. Adams was elected to Congress in 1858 and again in 1860. In 1861 President Lincoln appointed him minister to England. This position he held until 1868, during the period of the Civil War, and he met the difficult questions arising in such a way as to make his service one of the foremost triumphs of American diplomacy. He was elected a member of the Board of Overseers of Harvard College in 1869, and was for several years president of the Board. He edited the works of his father and grandfather in 22 volumes, and published many of his own addresses.

Adams, Charles Francis, Jr. (1835-1915), an American statesman and author, born at Boston, Mass. After graduation at Harvard in 1856, he studied law and in 1858 was admitted to the bar. At the beginning of the Civil War he enlisted in the Union army, was made a captain, and, before the close of the war, a brigadier-general. From 1884 to 1890 he was president of the Union Pacific Railway Company, and in 1901 was chosen president of the American Historical Association. His published works embrace *Notes on Railway Accidents, Massachusetts: Its Historians and Its History, Chapters on Erie and Other Essays, Life of Charles Francis Adams* and *Three Episodes in Massachusetts History.*

Adams, Charles Kendall (1835-1902), an American educator and historian, born in Vermont. At the age of 20 he removed to Iowa. In 1861 he graduated at the University of Michigan, and subsequently studied in Germany and France. In 1863 he became assistant professor in the University of Michigan and in 1867 was elected to the full professorship of history there. This position he held until 1885, when he succeeded Andrew D. White as president of Cornell University. In 1892 he was elected president of the University of Wisconsin, where he served until the year of his death. While in Ann Arbor he founded the history seminar, being the first to introduce this method of studying history into the United States. Besides papers and pamphlets on historical and educational subjects, his publications include *Democracy and Monarchy in France, Columbus, His Life and Work* and *A Manual of Historical Literature.* He also edited *Representative British Orations* and was editor-in-chief of Johnson's *Universal Cyclopædia.*

Adams, Henry (1838-), an American political essayist and historian, son of Charles Francis Adams, born in Boston, Mass. He graduated at Harvard in 1858 and later was professor of history in that institution. He was editor of *The North American Review* in 1875-76, and has written historical essays, a *Life of John Randolph* and *History of the United States from 1801 to 1817.*

Adams, Herbert Baxter (1850-1901), an American historian and educator, born at Amherst, Mass. He studied at Amherst College and at the University of Heidelberg, and in 1891 was appointed professor of history in Johns Hopkins University, remaining in this position until 1901, when he resigned on account of ill health. He was instrumental in founding the American Historical Association, and from 1884 until 1900 was secretary of that body, afterwards holding the office of vice-president. He did much for the cause of university extension, and through this movement he exercised a wide influence. His writings include *Thomas Jefferson, The University of Virginia, Life and Writings of Jared Sparks, Study of American Colleges and Universities, The Germanic Origin of New England Towns* and *Johns Hopkins Studies in History and Political Science.*

Adams, John (1735-1826), second president of the United States, was born in Quincy, Mass. He graduated from Harvard in 1755. His family hoped that he would enter the ministry, but he finally

chose the law and a political career. The year after his graduation was the year of Braddock's defeat, "when the smoldering fires of a century of rivalry between England and France in the New World broke out in a blaze of war." Adams took an intense interest in the struggle; from then on, during the stirring times that followed and that resulted in American independence, he was a clear-sighted and influential participant in public affairs.

He had begun the practice of law in Suffolk County in 1758. After ten years his practice had become so extensive that he removed to Boston. In 1770 he was elected to the Massachusetts Legislature, and speedily became the chief legal adviser and one of the foremost of the patriot party in its conflict with the royal officers. He was chosen one of the five delegates to represent Massachusetts in the first Continental Congress, which convened in September, 1774, and he drafted the resolutions on colonial rights passed by this Congress. In the Second Continental Congress, which assembled in May, 1775, Adams played a very important part, proposing Washington as commander-in-chief of the Continental army, seconding the resolution for independence and securing its passage, and serving on important committees.

In 1778 Adams sailed as commissioner to France, and in this capacity and as minister to Holland and England he remained abroad for ten years, save for a brief return home in 1779-80. In connection with Benjamin Franklin and John Jay he negotiated the peace with England which terminated the Revolutionary War, and was largely instrumental in securing for the new nation the great Mississippi Valley and other important concessions. He became the first minister of the United States to the court of St. James in 1785.

Returning home in 1788, he was elected the first vice-president of the United States, with Washington as president. He was reelected to this position four years later, and succeeded Washington as president upon the declination of the latter to accept a third term. After serving one term as president, Adams retired to private life on his estate at Quincy, where he spent the last 25 years of his life in the enjoyment of agricultural and literary pursuits. He died July 4, 1826, on the fiftieth anniversary of the national independence which he had done so much to secure, the same day that witnessed the death of Thomas Jefferson, his lifelong friend and political opponent.

Adams was a strong Federalist, and consistently advocated the importance of a vigorous centralized government as opposed to the Republican, or Democratic, Party of that day, which was jealous for the rights of the states. He was a man of virility, courage, aggressiveness and sincere patriotism. He was inclined to be loquacious and vain, but these traits are easily overlooked in the light of the inestimable services which he rendered his country in the day of the beginnings of its national life. See Study Guides.

Adams, John Quincy (1767-1848), sixth president of the United States and one of the greatest of American statesmen, enjoyed unusual educational advantages in his youth. At the age of 11 he accompanied his father abroad and studied for a number of years in France, Holland and Russia. At 14 he became private secretary to our minister to Russia. Returning home, he entered Harvard, graduating in 1788. In 1791 he was admitted to the bar and began the practice of law.

During the next few years he published a number of able articles in the papers. These attracted the attention of President Washington and led to his appointment as minister to Holland in 1794. He was appointed minister to Germany by his father, President John Adams, in 1797, where he remained until 1800.

In 1803 Adams was elected to the United States Senate by the Legislature of Massachusetts as a Federalist, but by his support of Democratic measures he so incurred the hostility of his constituents that in 1808 he resigned. During most of this period he also occupied a

chair at Harvard College, by special arrangement. In 1809 he went as minister to Russia. He was one of the five commissioners who in 1814 concluded the treaty of peace with England which terminated the War of 1812, and the following year he became United States minister to England.

Under President Monroe, Adams served as secretary of state. In this capacity he had much to do with formulating the "Monroe Doctrine" and he negotiated the treaty with Spain whereby Florida was ceded to the United States, and the boundary between the Louisiana territory and Mexico was established. He also formulated our present system of weights and measures and secured its adoption by Congress.

Mr. Adams succeeded Monroe in the presidency in 1825. His administration was characterized by a vigorous policy of internal improvements, but he was unable to satisfy any of the numerous political factions and was not reelected. In 1830 he was elected to the House of Representatives and for 17 years his service here was characterized by marked ability. His notable and long-continued efforts in behalf of abolition and the right of petition gained for him the title of "The Old Man Eloquent." He literally "died in the harness," being stricken with apoplexy on the floor of the House, and passing away two days later, Feb. 23, 1848. See Study Guides.

Adams, Mass., a town of Berkshire Co., 5 m. s. of North Adams and 16 m. n. of Pittsfield, on the Hoosac River and on the Boston & Albany Railroad. The villages of Maple Grove, Zylonite and Renfrew are included within its corporate limits. The town also contains Greylock, or Saddle Mountain, the highest point in the state, with an elevation of 3535 ft. It has large machine shops and manufactories of cotton and woolen goods, shirts, iron-foundry products and paper. Adams was incorporated under its present name in 1778 in honor of Samuel Adams. Population in 1920, U. S. Census, 10,967.

Adams, Maude Kiskadden (1872-), an American actress, born (Kiskadden) at Salt Lake City, Utah. Her last name was assumed for stage purposes. Maude Kiskadden's mother was an actress, and the child was brought up in an atmosphere of the theater and received an early training for a stage career. At the age of 16 she became a member of the company of E. H. Sothern, playing in *The Midnight Bell.* Subsequent engagements brought her under the management of the Charles Frohman Stock Company and then of John Drew. She played with Sarah Bernhardt in 1901 and afterwards achieved tremendous popularity in plays written by J. M. Barrie, conspicuously *Peter Pan, The Little Minister* and *What Every Woman Knows.* She also attracted much attention in rôles in *L'Aiglon* and *Chantecler.*

Adams, Samuel (1722-1803), second cousin of John Adams, has been called the "most illustrious citizen that Massachusetts has ever produced." From his father he inherited the political ability and aptitudes that made him the popular leader and hero of Revolutionary times in Massachusetts. He graduated from Harvard College in 1740 and then studied law, but soon turned to business pursuits, in which he was not largely successful. His real interest was in the public issues of the day, and he warmly espoused the patriot cause. He perceived sooner than most men the hopelessness of conciliation with England, and began early to exert his influence in favor of American independence. This has won for him the title of "Father of Revolution."

In 1764 he drafted the Boston resolutions against the Stamp Act, the first public protest in America against the right of Parliament to tax the colonies. In 1765 he entered the Massachusetts Legislature, where he served for nine years, much of the time as clerk of the House, drafting most of the remarkable State papers of that period of fierce controversy. After the "Boston Massacre" in 1770, Adams was chairman of the committee that forced the governor to remove the royal troops from the city. He proposed the "Committee of Corre-

spondence," by means of which the various cities and colonies kept in touch with each other, and which led directly to the convening of the Continental Congress. He was the leader in the destruction of the cargo of tea in the famous "Boston Tea Party" of 1773. So greatly was Adams' influence feared in England that an order was issued for his arrest, and later he was one of two who were excepted from the offer of general amnesty to those who would lay down their arms.

Adams was a delegate to the First Continental Congress in 1774, where he opposed all efforts at reconciliation with England. He also attended the Second Continental Congress in 1775, in which he favored an immediate declaration of independence and worked persistently to that end until its final adoption July 4, 1776. He continued to serve in Congress until 1781, after which time his public life was devoted to his native state. He was influential in securing the adoption of the new National Constitution by Massachusetts in the convention called for that purpose in 1788. In 1794 he became governor and was three times reelected to that position, retiring to private life in 1797.

Adams, William Taylor (1822-1897), better known as Oliver Optic, author and educator, born at Medway, Mass. He taught for 20 years in the public schools of Boston and served in the Legislature of his state for one year. More than 100 juvenile stories have been written by him. Among these are the *Young America Abroad* series, the *Boat Club* series, the *Starry Flag* series, *Onward and Upward, The Way of the World* and *Living Too Fast.*

Ad'dams, Jane (1860-), an American social settlement worker, born at Cedarville, Ill. She graduated at Rockford College in 1881, later studying at Philadelphia. The University of Wisconsin, Smith College and Yale have awarded her degrees. In 1889 Miss Addams, with Miss Ellen G. Starr, established at Chicago, Hull House, which, under her efficient leadership, has become the foremost social settlement in the United States. She possesses fine executive ability and practical common sense, and is always animated in her work by a rare spirit of unselfishness and sympathy. Miss Addams was for three years inspector of streets and alleys in the neighborhood of Hull House, and in 1909 was president of the National Conference of Charities and Correction. In 1912 she was actively connected with the organization of the Progressive Party, and made one of the speeches seconding the nomination of Theodore Roosevelt. In 1915 Miss Addams was elected President of the International Peace Congress, which met at the Hague. She is a lecturer and author of note and has published, among other writings, *Democracy and Social Ethics, The Spirit of Youth and the City Streets* and *Twenty Years at Hull House.* See SOCIAL SETTLEMENTS.

Ad'der, a name applied to several serpents chiefly of the Viper Family. The adder of the British Isles is a poisonous snake about two feet in length and dark in color. The American adders are harmless and are generally known locally by other names. In South Africa the puff adder is a viper which has received its name because of its habit of swelling its body when angered.

Adding Machines. See CALCULATING MACHINES.

Ad'dison, Joseph (1672-1719), English poet and essayist, was born in his father's rectory at Milston in Wiltshire. He entered Oxford when he was 15 and took his master's degree in 1693, gaining, while at college, an honorable reputation as a versifier in Latin. His first notable literary effort, a Latin poem on the Treaty of Ryswick, brought him, in 1699, a pension of £300 a year, enabling him to travel in Europe. He continued writing while abroad, and soon after his return to England in 1703 was commissioned to write a poem in celebration of the victory of Blenheim. His poem, *The Campaign* (1704), gained for him a government appointment, which was the first of many official honors that fell to him. From 1704 until the fall of the Whigs in 1710 he was engaged in public service to the

exclusion of any notable literary work, except that during his last months of office he wrote for the *Tatler,* begun by Steele in 1709.

The four years from 1710 to 1714, when the Tories were in power, constitute the most important epoch in his career; freed from the duties of public office, his chief employment was the writing of his famous periodical essays. The *Tatler* was dropped in 1711 and was succeeded by the *Spectator,* to which both Addison and Steele contributed. It appeared every week day from March 1, 1711, until Dec. 6, 1712, and each number constituted an essay. Of the total number of 555 essays, Addison wrote 274. When the *Spectator* papers were resumed in 1714, Addison contributed 24 out of a total number of 80. These essays avoided politics and dealt with real life. Some were directed against such coarse vices as gambling, drinking, swearing and cruelty, while others ridiculed some of the common follies of the day—coquetry, frivolity in dress and manner, and other varieties of foolishness. The introduction of the kindly and simple Roger de Coverley was a most happy invention, giving added interest and life to the series, while a new character was added to English fiction. Moreover, the *Spectator* papers are a definite step in the development of the English novel. The most important work on these papers was done by Addison, for he combined a most graceful and pleasing style and kindly humor with a trained critical taste in literary matters, and the *Spectator* is greatly enriched by his scholarship. A tragedy entitled *Cato* (1713) also belongs to this period of his career.

When the Whigs came to power in 1714 Addison again became an office-holder and thereafter he wrote practically nothing except a few political pamphlets. In 1717 he became secretary of state, resigning the office in a few months because of ill health. His last days were made sorrowful by a quarrel with his old friend, Richard Steele. He was buried with impressive services in Westminster Abbey. The famous words of Samuel Johnson fitly characterize Addison's position in English prose literature: "Whoever wishes to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison."

Addison, Margaret Eleanor (1868-), a Canadian educator, born in Ontario. Graduating from Victoria University, she began to teach in September, 1889, in the Ontario Ladies' College, and subsequently taught in Stratford and Lindsay College institutes. In 1903 she was appointed dean of Annesley Hall, Victoria University, Toronto. Moreover, she lectures in German in Victoria College, being the only and the first woman lecturer in the institution.

Address', Forms of, the titles used in addressing written communications to persons in official position or in high rank. Much greater formality is observed in monarchial countries than in the United States. The Constitution of the United States forbids any title being conferred upon the president, but usage has sanctioned the following form of address: *His Excellency, the President of the United States. His Excellency* is also sanctioned when addressing the governor of a state and ambassadors and ministers of the United States in foreign countries. The vice-president may be addressed as *The Honorable* ————, *Vice-President of the United States.* In discharge of his duties as president of the Senate, he is addressed by members as *Mr. President.* It is customary to prefix *Hon.* to the address of a mayor of a city, members of Congress and members of state Legislatures, also to judges of courts. Members of the Supreme Court of the United States are usually addressed as *Mr. Justice.*

In addressing persons of professional rank, it is customary to prefix the abbreviation indicating their profession to the name, as *Dr.* ——, *Rev.* ——, *Prof.* ——. The name may be followed by the degrees which the person bears, as *Rev. Thomas Brown, D.D., LL.D.* When more than one degree is added, the degrees should follow in the order of rank,

Adenoids. An excessive growth of a spongy tissue in the space between the back of the nose and the throat. This growth obstructs the passage through which the air reaches the lungs, and breathing through the nose becomes difficult or impossible. The obstruction of the air passages prevents the proper expansion of the lungs and the development of the chest. Children suffering from adenoids have usually a characteristic facial expression, with open mouth and a staring, half-stupid look. They "catch cold" very easily, are hard of hearing and very often suffer from running ears. Such children sleep with the mouth wide open; they snore and are restless in their sleep. Mentally the child remains backward, is unable to concentrate his attention for any length of time, and is generally slow and dull. The presence of adenoids retards both the physical and mental development of the child. Children suffering from adenoids usually have enlarged tonsils.

Treatment consists in the cutting out of the adenoids. This operation when performed by a skilful surgeon is practically without danger. But it is not advisable to operate upon children who bleed freely from the nose or mouth. In the great majority of cases the removal of adenoids brings about in the child a very pronounced physical and mental improvement. The child starts to grow quickly, his chest develops, and he soon gains his weight and strength.

———.

Ade, George (1866-), author, humorist and playwright, born at Kentland, Ind. He graduated at Purdue University in 1887 and immediately became engaged in newspaper work in Lafayette, Ind. Later he removed to Chicago and continued in the same field, gaining recognition through his sketches of street life. His writings, many of which are in slang, are characterized by a quiet humor, often satiric. It was through *Fables in Slang* that his reputation was made. Among his well-known plays are *The Sultan of Sulu, The College Widow, Peggy from Paris, The Sho-Gun, Breaking into Society, The County Chairman, Just Out of College, True Bills* and *United States Minister Bedloe.*

Ad'elaide, the capital of South Australia, on the Torrens River near its entrance into the Gulf of St. Vincent. It is a beautiful, modern city, divided by the river into two parts which have become respectively the business and the residential section. The latter includes many suburbs with attractive homes. Adelaide has many interesting and pleasing public buildings, among which are those of the university with its justly-famous botanical garden, the Houses of Parliament, the government buildings and the South Australian Institute. The city was named in honor of Adelaide, Queen of William IV. Population, 205,000.

Ad'eler, Max. See CLARK, CHARLES HEBER.

Aden, *Ah'den,* **Gulf of,** a part of the sea, between Arabia and Aden, extending from the Strait of Bab el Mandeb to the Indian Ocean. It is 500 m. long.

Adhe'sion, the force by which substances of different kinds tend to cling to each other. It is a kind of molecular attraction and is of the same character as cohesion. It acts between solids, as, when two smoothly polished pieces of glass are pressed together tightly, great force is required for their separation. Since this force acts equally well in a vacuum, it is not due to atmospheric pressure. Adhesion also acts between solids and liquids. A simple experiment illustrates this: lay a flat disk upon the surface of water; when the disk is lifted, a column of water, which is finally broken away, tends to follow. It is this same force, which, greater than the force of gravity, holds a drop of water at the end of a glass rod that has been dipped in water. The bubbles of air that surround the rod when it is placed in water show that adhesion also acts between solids and gases. Innumerable instances of adhesion may be noticed, the action of glue, dust on vertical walls, paint upon a house, etc. See COHESION.

Adige, *Ah' de ja,* one of the large and

important rivers of northern Italy, rising in the Rhætian Alps of Tyrol. It flows south and east for 250 m., and empties into the Adriatic Sea above the Po River. The total navigable length is 180 m. The Adigetto Canal connects it with the Po, and the river is useful in the commerce of Germany and Italy.

Ad"iron'dack Mountains, a group of mountains situated in the northeastern part of New York and belonging to the Appalachian system. They extend southward to near the center of the state. Formerly the entire region was heavily timbered, but in many sections the timber has been cut. In the sections where the forests have not been disturbed, the scenery is wild and grand. Mt. Marcy (5345 ft.) is the highest peak. The mountain valleys contain many beautiful lakes. For years the entire region has been a favorite locality for tourists and sportsmen. The Adirondack region has been made a state public park.

Ad'jutant Bird, a bird allied to the stork and heron. It stands nearly five feet in height, has long legs, a long, heavy bill and a bare head and neck. A peculiar pouch hangs from the chest. The plumage is ashy gray above, with greenish reflections, and white below. The large nest is made on rocky cliffs or in trees, and two to four chalky-white eggs are laid. The Indian adjutant lives in lower India and the Indo-Chinese countries. It eats fish and snakes, but feeds chiefly on carrion. Because it is an excellent scavenger it is protected by law in many places.

Ad'ler, Felix (1851-), educator, author and reformer, born in Alzey, Germany. At the early age of six, the removal of the family to America brought him to New York City, where his father became a Hebrew rabbi. In 1870 he graduated at Columbia College and later studied at Berlin and Heidelberg, obtaining the degree of Ph. D. Returning to the United States, in 1874 he was made professor of Hebrew and Oriental literature at Cornell University. Two years later he removed to New York City, where he organized a new religious order, the Society of Ethical Culture, the influence of which has been widespread. In 1902 he resumed his educational work as professor of political and social ethics in Columbia University. Besides his many contributions to periodicals, his publications include *Creed and Deed,* a series of discourses presenting his religious views, *The Moral Instruction of Children, The Essential Difference Between the Ethical Societies and the Churches* and *Life and Destiny.*

Adme'tus, an Argonaut and the legendary King of Pheræ, in Thessaly, wedded to Alcestis, who so loved him that she agreed to die in his stead. See ALCESTIS.

Ad'miral, a naval officer of high rank. Not all admirals are of the same rank, as there are vice-admirals and rear-admirals. An admiral receives the largest salary of any naval officer, and ranks with a general in land forces. An admiral has command of several ships, constituting a squadron or fleet. The term is also applied to the ship of the fleet which carries the admiral, the flagship. The admiral's flag is flown from the main-top-gallant masthead and his salute is 17 guns. In the United States his salary is $13,500 a year for life, and $14,850 while at sea. See NAVY.

Ad'miralty Island, an island off the coast of Alaska, just south of Juneau. It is about 80 m. long and is covered with forests containing valuable timber. The inhabitants are Sitka Indians.

Ad'miralty Laws, the systems of laws and procedure relating to maritime transactions. The name originated from the fact that in England cases pertaining to the high seas were under the jurisdiction of the lord high admiral. At present the ordinary jurisdiction of English Admiralty Courts embraces actions to recover possession of a ship, to recover seamen's wages for salvage, for the restoration of goods taken unlawfully and for assaults on the high seas. In the United States, admiralty powers are vested in the United States District Court, and such jurisdiction extends not only to the high seas but other public

waters, including lakes and navigable rivers. Appeals may be taken from the District Court to the Federal Circuit Court of Appeals, and some of the cases may reach eventually the Supreme Court.

Ado'be, a name derived from the Spanish and commonly used in the Southwestern States to designate buildings constructed of unburned bricks made of sand and clay and sun-dried. Originally *adobe,* meaning to daub or plaster, was applied to these bricks, but the term is given as well to the building itself. Where the average rainfall is not great, structures built of adobe last indefinitely, with reasonable repair. In wet weather great disintegration occurs at the base or the foundation of these adobe huts. By plastering and daubing they are repaired to meet the wearing away by sand storms and by the rains. Bricks made by the Children of Israel were "without straw" and were adobe. This word has been corrupted to *dobie,* and is traceable through Arabic to an Egyptian picture writing meaning brick. See BRICK.

Ado'nis, a mythological hunter beloved by Venus for his youth and beauty. She begged him not to expose himself to danger, but, disregarding her pleas, he attacked a wild boar, which turned and killed him by burying its tusks in his side. In commemoration of her grief Venus changed his blood into the anemone. As partial consolation, Proserpine granted the entreaty of Venus that Adonis spend six months of each year on earth with her.

Adrian, *A' dri an,* the name of six popes. Adrian IV (1100-1159) was the only Englishman that ever occupied the papal chair. He became pope in 1154. Adrian V settled the dispute between Henry III of England and his nobles in favor of the King. The others performed no deeds of world-wide interest.

Adrian, Mich., a city and the county seat of Lenawee Co., 33 m. from Toledo and 60 m. from Detroit, on the Raisin River and on the Wabash, the Lake Shore, the Toledo & Western, the Toledo, Detroit & Ironton and other railroads. In addition to its extensive agricultural interests, the city is an important manufacturing and shipping center. It is especially well known for its large output of wire fencing. In the town are also planing mills, flour and grist mills, foundries, machine shops and manufactories of farming tools, automobiles, United States mail boxes, pianos, organs, toys, furniture and electrical supplies. Adrian has good educational facilities. It contains Adrian College (Methodist), St. Joseph's Academy (Roman Catholic), the Industrial Home for Girls, a state reformatory for juvenile offenders and a business college. There is a fine public school system, and there are numerous handsome buildings and a public library. One weekly and two daily newspapers are published in Adrian. Founded in 1825 by Addison J. Comstock, the place was incorporated as a village in 1828 and as a city in 1833. Its first name was Logan. Population in 1920, U. S. Census, 11,878.

Ad"riano'ple, a city of Turkey, situated 137 m. by rail n. w. of Constantinople, at the confluence of the Tunja and Maritza rivers. In the midst of mean, wooden houses in the narrow, winding streets are a few better buildings, including a great mosque, a bazaar, a fine tower, several palaces, schools, a theater and two hospitals. The manufactures include attar of roses, silk, woolen and cotton goods and leather. The wines produced in the surrounding country are the best in Turkey. Population in 1919, about 80,000.

A"driat'ic Sea, a large arm of the Mediterranean, separating the Italian and Balkan peninsulas, and connecting with the Ionian Sea by the Strait of Otranto. Its length is 500 m. and its greatest width 130 m.; its depth, 500 ft. in the north, increases to over 5000 ft. near Durazzo. It receives the waters of the Po and the Adige rivers. The gulfs of Venice and Triest are in the north and the northeast, and along the eastern coast are several rocky islands. The important ports are Triest, Venice, Ancona, Fiume and Brindisi. Naviga-

tion is fairly safe, except along the eastern coast. Its commercial importance, greatly impaired when the sea route to India was established, has been restored in part since the opening of the Suez Canal.

Adul"tera'tion, in its commercial sense, the admixture of an article of inferior grade and less value with one of greater value, or the addition of a preservative to commodities which tend to decay when exposed to the air. Mixing chicory with coffee, and burdock or cabbage leaves with tobacco, are good illustrations of the first sort, and the addition of a preservative to milk is a good illustration of the second sort. The object of adulteration is usually pecuniary profit, and for ages it has been practiced in all civilized countries. In some industries the process constitutes a valuable trade secret, and notwithstanding enactment of stringent laws against the practice, it seems impossible wholly to prevent it. During President Roosevelt's administration the United States Congress enacted the Pure Food and Drug Law, which requires the wrapper of any food or medicine to state the ingredients of the mixture and the proportion of each ingredient. Anyone not complying with the law or falsely labeling his product is subject to prosecution. See Food.

Ad'ventists, those religious sects which emphasize the second personal coming of Christ, which they look forward to as near at hand. William Miller, who began in 1831 to prophesy the end of the world and the establishment of the Kingdom of Christ in 1843, was the founder of the Adventists. They are now separated into a number of different sects, of which the Seventh Day Adventists observe Saturday, instead of Sunday, as the day of rest. The various branches of the Adventist denomination reported in 1919, 2700 churches, 1500 ministers and 125,000 communicants.

Ægean, *E je' an,* Sea, that part of the Mediterranean which lies between Greece and Asia Minor. Its length is about 400 m. and its greatest width is 175 m. With its numerous islands, including Delos, Syra, Cythnus and Melos (belonging to the Cyclades group) and Rhodes, Samos, Patmos, Lemnos and Cos (a part of the Sporades group), it was formerly referred to as the Archipelago. These islands have been the birthplace of some of the great poets and philosophers, and have a permanent place in Greek history and literature. Their origin is volcanic. The climate is healthful and the scenery beautiful.

Ægospotami, *E" gos pot' a mi,* a town on the eastern coast of the Thracian Chersonese, where in 405 B. C. the Spartan fleet under the command of Lysander surprised and defeated the Athenian fleet. This battle ended the Peloponnesian War and marked the beginning of Spartan supremacy in Greece.

Æneas, *E ne' as,* son of Anchises and Venus, was a brave chief of the Trojan War, where his achievements ranked next to those of Hector. When Troy burned he took his aged father, Anchises, upon his shoulders, and, with his wife, son and a band of homeless companions, set out for the mountains of Ida. Having there constructed a fleet of 20 vessels, they left the Trojan shores in search of a new home. About five years later, having experienced innumerable landings, disappointments, conflicts with monsters and reembarkings, Æneas and his friends were driven by a severe storm to the African coast opposite Sicily. Here they were kindly welcomed by the Carthaginian Queen, Dido, who shortly became so enamored of Æneas that she offered him herself in marriage, since his wife had been lost in the flight from burning Troy.

Æneas tarried months, seemingly well pleased, till the gods feared that he would forget the empire that he was to establish in Italy, where his people would rule all others. Therefore they sent Mercury to remind him, and Æneas left at once, leaving Dido so crushed that she killed herself. After many adventures the wanderers reached Cumæ, where Æneas visited the Sibyl. Besides encouraging him with "Yield not to disasters, but press onward the more bravely," she con-

ducted him down to Avernus, the underworld, where Father Anchises revealed to Æneas his fate and that of his descendants, the Romans.

Æneid, *E ne' id,* the greatest of Roman epics, was written by Vergil during the 11 years from 30 B. C. to 19 B. C. It consists of 12 books, the first six of which treat of the wanderings of Æneas and his followers after the fall of Troy, and the remaining six of their settlement of Italy. The Æneid, unlike the Homeric poems, was composed as the definite work of a single artist, and its purpose was to glorify Rome and the Julian house of emperors. See VERGIL; ÆNEAS.

Aeronautics, *A" er o naut' ics,* the art of navigating the air, one of the latest achievements of man. When the century opened, we were just mastering the principles involved. We have made progress through the experimental stage of this discovery, and under the stress of war have entered on the stage of practical accomplishment, since flying machines of various classes are now a vital necessity to an army. They have indeed become a deciding factor in warfare (See European War). We are just on the threshold of development for peaceful purposes.

There have been two lines of development resulting in two classes of flying craft, airships and air planes. Air ships are essentially balloons. In our illustration, this fact is graphically represented (The Balloon). The balloon stage represents the raft of primitive man, at the mercy of currents, tides, and wind. Experiments extending through many years, have resulted in the Super-Zeppelin shown in the illustration, which is to the primitive balloon somewhat as the fast sailing steamer, forcing its way against wind and tide is to the raft of early times. Airships of this nature probably represent the final stage of balloon development.

They are called Zeppelins after their inventor, Count Ferdinand von Zeppelin of Germany, who made the first successful ship of this kind (See Zeppelin, Ferdinand, Count von). All Zeppelins are of this type though this particular one has been modified for military purposes. They are called rigid-framed dirigible balloons. Rigid, because the frame work is of aluminium, divided into a number of strongly braced sections. In each section is a separate balloon, the total arrangement being like a row of huge lozenges. The entire frame work is fabric covered, in length nearly 700 feet, height 78 feet. The gondolas are attached to the framework beneath. The cars are torpedo shaped, like the body of the ship itself. This shape presents the least resistance to motion. The cars are from thirty to fifty feet in length, divided into the engine-room and cabin. In the engine-room is a maze of machinery. The entire ship is under command of a captain in the forward gondola, and his car is provided with wireless attachments as are ocean steamers.

The five motors are each of 240 horsepower. The ship could develop a speed of about 80 miles per hour, it could ascend to a height of four and a half miles. In this ship several machine guns were placed in various positions. Store rooms, a passage way, and sleeping quarters for the crew were in the inclosed hull. In addition to the crew, machine guns and supplies, this ship carried more than a ton of bombs. Before the war, Zeppelins were carrying passengers in Germany. They differed in details of construction, but were of the same general nature. Zeppelins have not proved a success in war and it seems as if they would not be able to compete with airplanes as they will be developed for purposes of peace.

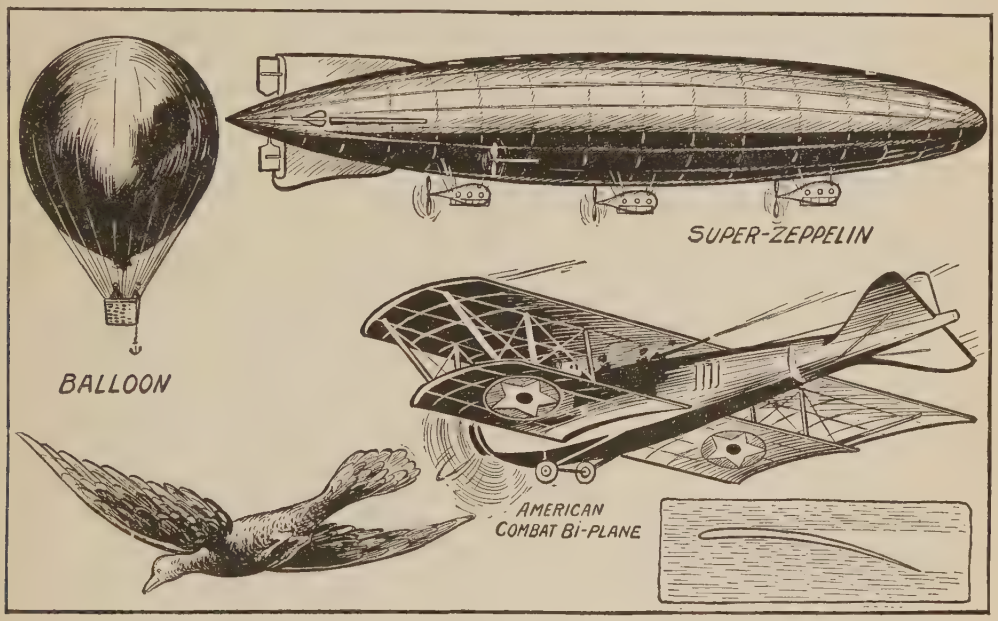
In the lower half of the illustration is represented the second line of evolution that has resulted in airplanes. An airplane is a mechanism that successfully applies the principle of flight that nature employs in flying birds. It is true we did not begin our experiments with attempts to imitate the bird body but by studying the action of wind on a resisting surface as in kites; but one only needs to study

AERONAUTICS

the illustration that represents the most approved type of airplane construction to see that we have finally made a mechanical bird.

The general resemblance is striking. It would be more so had we represented a monoplane. Similarities in details of construction and application of principles disclose themselves on investigation, and it becomes evident that nature has been holding before us for ages a working model, to study, and in a distant way to imitate, if we would secure flight. We do not copy the flapping motion of the

The body must extend some distance behind the planes so that the rudder can work in steering, and as in the weathercock, there must be more keel surface (all that you see of the machine when looking at it sideways) behind the axis of turning (near where the operator sits). The action of the rudder together with the tail planes is to preserve lateral stability and to make the machine nose into the wind. If you will notice a pigeon when it starts to fly you will see the outspread tail feathers performing the same function.



wings, but the revolving propeller in a way imitates, quite strongly so in principle, the flapping wings, as the outstretched planes represent the soaring wing. In our mechanical bird then we employ two mechanisms to successfully produce the effect that nature secures by the use of one mechanism. The long fish-shaped body is called the fuselage. A body so shaped is said to be stream-lined and presents the least resistance to forward motion. Notice that nature used that shaped body for fishes, also that the bird assumes the same general shape.

The frame of the fuselage is composed of strong light wood. The covering may be of fabric, metal or wood. Formerly we employed only a framework outline extending back to the rudders; we now copy nature, she covers in the body of her flying birds and thus reduces the drift. The forward, large end of the body holds the pilot, the engine, the supply of gasoline (petrol) and the various control mechanisms that the pilot employs in steering the machine. In the flying bird the heart, lungs and intelligence that controls the bird-body are placed in the front

part. Notice, as we gain in efficiency we more faithfully imitate nature.

This is a bi-plane because there are two supporting plane surfaces. The lower plane is firmly attached to the fuselage. The distance between the two planes is the interplane distance. Practically that distance is about that of the chord (width) of the planes. The upper plane is staggered (thrust) forward over the lower plane a distance of about one-third of the chord. This is necessary, for otherwise the currents of air set in motion by the two planes would interfere with each other. The ratio of span to chord (length to width) of the plane is known as the aspect-ratio. In general terms the higher this ratio, the greater potential velocity and lifting power.

Consider the wings themselves. Notice a line near the edges extending lengthwise. Those lines represent the main spars, curved lines are represented crossing the planes in the direction of the chord; these are the ribs. Both are made of wood. The planes are covered with fabric. Linen is the best, but other fabrics are used. The fabric itself is covered with a preparation known as the dope. There are two such fabric surfaces to each plane, and spares, ribs and rib wires are covered in; just as the skeleton of the bird's wings are covered in on both sides with skin and feathers.

The airplane is represented as gliding downward. If it were horizontal, we would notice that the planes are set at a slight angle to the fuselage. That is the angle of incidence, and it plays a very important part in the mechanics of flight. To climb, it will be necessary to point the nose of the machine upwards, by means of the tail rudder, that is to increase the angle of incidence. The outstretched wings of every bird that flies presents such an angle which the bird instinctively knows how to change as his needs demand.

The surfaces of the planes are curved, or cambered. In this we faithfully follow nature, for she curves both surfaces of the wings of all her feathered flyers. She must have some good reason for so doing. In the small inserted illustration is represented the effect of the air on such a curved surface moved through it. In the first place, the under surface is so curved that it receives the maximum effect of the inertia of the air against which it impinges, that is the effect produced by the air on a kite. In the second place, the curved upper surface tends to thrust the air away from that surface and thus produces a rarified area (a partial vacuum) over the upper surface, for remember when the air plane is moving 100 miles an hour, it is traveling nearly 150 feet a second. The result is a suction effect, an uplift, a negative pressure, as it is called, and two-thirds of the total uplifting power of the wings is due to that cause.

In spite of the great development and practical application of air planes to military purposes, we are yet in the experimental stage of development for purposes of peace. Enough is already known, however, to enthuse all reflective minds when contemplating the future. To make the dreams real, only calls for more extensive use of present known principles. The navigators of the times of Columbus could not even dream of present day ocean navigation, of the Atlantic crowded with stately liners, massive freighters and dreadnaughts of the deep.

Æschines, *es' ki neez* (389-314 B. C.), a celebrated orator of ancient Athens, the rival and opponent of Demosthenes. He headed the party in Greece which favored an alliance with Philip of Macedon, while Demosthenes took the opposite side. Having failed in 330 B. C. to convict Ctesiphon of treason in having proposed to bestow a crown of gold upon Demosthenes for his services to the state, he withdrew from Athens. Later he established a school of eloquence at Rhodes.

Æschylus, *Es' ki lus* (525-456 B. C.), a Greek poet, the first of the three great Athenian tragedians, born in Eleusis. He fought in the battles of Marathon, Salamis, Artemisium and Platæa, rejoicing with his countrymen at the downfall

of Xerxes and Darius. In all he produced about 90 plays, of which only seven are extant. As many as 12 prizes were bestowed on him, and for a period of over 26 years he was the leading figure among the dramatists of his day. He visited Sicily several times, and upon his death was buried at Gela. The development of the drama owes at least two things to Æschylus: the introduction of a second actor, whereby action and dialogue are added to the recitation of the chorus; and the general elevation of the tone of drama as a whole by its seriousness, its grandeur of conception and widening of range. His tragedies are often dark with the gloom of fatalism; the reader gets only a faint conception of the magnificence and stateliness of the spectacle when performed on the stage. The seven plays which now exist are *The Suppliants, The Persians, The Seven Against Thebes, Prometheus, Agamemnon, The Chœphori* and *The Eumenides.*

Æscula'pius, *Es" ku la' pi us,* the mythical god of medicine and son of Apollo, who intrusted him from infancy to the Centaur Chiron, under whose tutelage Æsculapius became a famous physician. From Minerva he received the blood of Medusa with which to restore the dead to life. This power so terrified Pluto that he complained to Jupiter. Æsculapius was consequently struck by a thunderbolt, though on his death he was welcomed as one of the gods. He is usually depicted as an aged man, with long beard, carrying a heavy staff entwined with a serpent.

Æsop, *E'sop,* a Greek writer of fables, said to have been born a slave in Samos, in the latter part of the seventh century B. C. It is doubtful that he really existed; at any rate all the fables ascribed to him belong to a later period than the one in which he is thought to have lived. His name is now attached to most of the beast fables that are common to the Indo-European peoples. In 320 B. C. Demetrius of Phalerum made a prose collection of all the fables current in his day. In the 14th century appeared a collection of *Æsop's Fables,* made by Maximus Planudes; a complete collection was published in Breslau, Germany, in 1810.

Æsthetics, *Es thet' iks,* the philosophy or science of the beautiful in nature and in art. There are three fundamental properties in reality: the true, the good, the beautiful. *Metaphysics* and *logic* treat the first, *ethics* the second, and *æsthetics* the third. In a general way, it may be said that the intellect deals with truth, the will with the good, and the feelings with beauty. Æsthetics is therefore primarily concerned with the feelings of pleasure or pain arising from the contemplation of the beautiful or the ugly.

There are two modes of treating æsthetics. One is the philosophical or metaphysical, which considers the question, What is it in things that makes them beautiful and what is the relation of the beautiful to the ultimate nature of the universe? The other method is the scientific, which considers specific objects of beauty and studies their elements. We are thus led to the contemplation of nature and the beautiful there existing; and to the study of works of art, in which the æsthetic taste of various ages has found expression.

Af"fida'vit, the name of a legal document containing testimony in writing. The testimony is given under oath, and the person giving it signs his name at the bottom. The document is also signed by a notary public or some other officer who is authorized to administer oaths. Affidavits are used for placing testimony before a court or a judge when the witness cannot be present.

Affin'ity, the chemical force by which two elements of differing characteristics unite to form a compound. This force serves also to hold them together unless they are separated by chemical means. The nature of affinity is not known, but is now believed to be electrical. Elements which have affinity for each other are supposed to have their particles charged with electricity, hence they act upon each other with greater or less attractive force according to the number of particles involved. See ATOM.

Afghan″istan′, an inland country of central Asia, separated from Turkestan on the north by the River Oxus, or Amu-Darya, and from India on the e. by the Hindu Kush and the Suleiman Mountains; on the s. it is bounded by Baluchistan, and on the w. by Persia. Although its boundaries are not definitely placed, its area is estimated at 250,000 sq. m. The country is largely mountainous but contains some desert region and some fertile valleys. In these valleys grains, fruits, nuts and many beautiful plants are raised, the latter for their perfume. The southwestern part is arid, and in summer the heat becomes almost unendurable, while in the central and northern regions the cold of winter is equally severe. On the whole, however, the climate is said to be healthful.

There are many rivers but none of great importance. In their basins, tobacco, cotton, rice, sugar cane and maize are raised. Other products of Afghanistan are the minerals, gold, silver, mercury, iron, lead, copper, sulphur, antimony and coal. Carpets and saddlery are manufactured and exported, but the other manufactured goods, chiefly textiles, are merely for home consumption. The chief cities are the capital, Kabul, Herat and Kandahar. The people, known as Afghans, are of the Indo-European race; they are warlike and impatient of control.

Since the middle of the 18th century, when the country freed itself from Persian rule, Afghanistan has been governed by a hereditary ruler, styled the Ameer. The chief importance of Afghanistan is its location between the two watchful powers, Russia and England, each eager to secure control over it. Its population is estimated at 5,900,000.

Africa, the second largest of the grand divisions of the globe. It lies in the Eastern Hemisphere, between 37° 25′ north and 34° 50′ south latitude and between 51° 21′ east and 17° 30′ west longitude. The Mediterranean Sea is on the north, the Atlantic Ocean on the west and south, and the Indian Ocean on the east. It is separated from Europe on the north by the Strait of Gibraltar, and is joined to Asia on the northeast by the Isthmus of Suez.

Size. From north to south its extent is about 5000 m.; its greatest width from east to west is 4500 m. The total area is about 11,250,000 sq. m. In form it resembles South America in that its main mass runs from north to south, with the equator crossing it near the middle of its length, and from that point tapering gradually to the south. The coast line has a length of 18,400 m. and is regular to an extraordinary degree; deep gulfs and well-defined peninsulas are wholly absent. Only the northern coast is irregular, and this is due to the protruding parts of the Atlas Mountains.

Coast Waters and Islands. In addition to the Mediterranean Sea are the gulfs of Gabes and Sidra and the Strait of Gibraltar on the north; the Red Sea and the Gulf of Aden are on the east and the Gulf of Guinea on the west. The African islands are few, Madagascar being the only large one. It is separated from the mainland by the Mozambique Channel, a body of water of great and continuous depth. Other islands are the Seychelles, Zanzibar, Pembra, Mafia, Mauritius and Sokotra, off the eastern coast; the Madeira, the Canary and Cape Verde archipelagoes, the Bissagos, Fernando Po, Prince, St. Thomas, Ascension, St. Helena and Annobon, off the western coast; and the islands of Jerba and Kerkenna, in the Mediterranean.

Physical Features. Africa is a plateau surrounded with a narrow border of lowlands along the coast. The mean elevation of the entire continent is about 2000 ft. There are no great depressions, and the high altitudes are confined to a few mountain ranges and isolated peaks. In the north the structural lines of the continent have the east-to-west trend common to Asia and Europe, but in the south these lines have the north-to-south trend common to the Americas.

Highlands. A line drawn from the middle point of the Red Sea to the head of the Bight of Biafra divides the highland region having an east-to-west trend

from that having a north-to-south trend. In the first region the Atlas Mountains in the northwestern part of the continent contain the highest altitudes, the two highest peaks, Tizi-Tamjurt and Miltsin, having altitudes respectively of 14,500 ft. and 11,500 ft. To the south and east of these mountains is the great desert plateau varying in altitude from 500 to 2000 ft. In the central part of this region are two elevations forming the Timmo and Tarso mountains, which exceed 2000 ft. in altitude. To the south of the Tarso Mountains is another elevation of about 2000 ft. An irregular line drawn from the southern boundary of this elevation to the northwest and then westward to the Atlantic coast marks the northern boundary of the basins of the Niger and the Congo. Bordering on the coast of the Gulf of Guinea are also low mountain ranges, and in the extreme northeast are the bluffs along the Red Sea.

The region having the north-to-south trend includes all the southern part of the continent, and its main axis extends northward to the Red Sea. With the exception of the Congo basin and the lowlands along the coast, this region consists of a plateau 2000 ft. or more in altitude, from which rise a number of mountain ranges. Chief among these are Sabre Mountain and the Drakensberg Range in the south, which rise in single peaks to 11,000 and 9000 ft. The arid depression in the south-central part of this plateau north of the basins of the Limpopo and Orange rivers constitutes the Desert of Kalahari.

The East African Plateau is to the northeast of the South African Plateau and is formed by an expansion of the principal highland. It is somewhat higher than the plateau to the south and increases in altitude until it reaches the Red Sea. The highland ranges are here separated by valleys, in some of which the largest lakes of the continent, including Nyassa, Tanganyika, Albert Edward and Albert, are found. To the east of Lake Victoria is the highest range on the continent, culminating in the peaks Kenia (17,200 ft.) and Kilman Jaro (19,720 ft.), while the Ruwenzori between lakes Albert and Albert Edward is estimated from 16,000 to 18,000 ft. Though in equatorial regions, these lofty summits are crowned with perpetual snow and glaciers extend down the sides of the mountains to an altitude of about 13,000 ft. All these ranges are broken by trough or rift valleys. To the west of this plateau and extending to the coast is the great Congo region, with an area of over 1,000,000 sq. m. The plateaus descend to the coast by a series of steps, each large enough to form a broad plain, thus constituting a series of levels between the interior and the sea.

AFRICA

Lowlands. Only a small portion of the continent is below 500 ft. The most extensive regions are along the west coast north of the Congo Plateau, on the coast of the Mediterranean west of the Nile, and the narrow steps bordering the eastern and western coasts of the southern part of the continent. In many places these lowlands become marshes before reaching the sea.

Rivers and Lakes. The rivers of Africa are divided into two systems, the outer- and the inner-flowing streams. Those which flow from the outer slopes of the mountains have naturally a very short course and are unimportant. The rivers enclosed within the fringing highlands are long and drain the greater part of the continent. The Zambesi is the only large river flowing into the Indian Ocean; the others include the Jub, Rufiji, Tana and Limpopo. The Senegal and Niger are the important rivers in the west. The Nile and the Congo belong to the Atlantic basin, and with their tributaries flow principally north and west. The Orange River drains the southern part. At intervals these streams suddenly descend over the sides of the plateau, and cataracts are formed which obstruct navigation. Among the freshwater lakes, and next to North America the continent of Africa contains the largest, are the Victoria Nyanza, Albert Nyanza, Albert Edward, Nyassa, Bangweolo and Tanganyika. Lake Chad lies about 900 ft. above sea level; it is almost

in the center of the continent and is without outlet.

Geology. Many of the geologic formations of Africa are still unexplored, and, due to the scarcity of fossils, it is difficult to determine the age of those that have been studied. Among the prevailing types of rocks are schists, granites and gneisses. The diamond and gold regions of South Africa are among the largest known. Kimberley and the vicinity represent the greatest diamond region, and the Transvaal Colony contains the bulk of the gold deposits. The mines at Kimberley were opened in 1868, and the gold mines near Johannesburg were first worked in 1883. Building stones are contained among the rocks, and the granite and syenite found along the basin of the Nile have been excavated since the time of the Pharaohs. Deposits of granite and sandstone have also been found along the Orange River. In the Congo basin are valuable iron and copper deposits, and coal has been found to a limited extent along the Zambesi River.

Climate. The greater part of Africa lies within the tropics and the remainder stretches into both the north temperate and the south temperate zones; hence the climate possesses an extraordinary degree of uniformity. The region in the neighborhood of the equator is to a great part sufficiently elevated to cause the climate to become cool. The heat is most oppressive between the parallels of 10° and 20° north. Greater than the difference of temperature are the variations in the amount, the distribution and the season of rainfall. The Sahara, the most extensive continuous desert on the earth's surface, has a marked continental climate. The rainfall is slight because, although the equatorial winds do carry a small amount of moisture, the dry winds by far prevail. Equatorial Africa has a heavy rainfall. Another dry region which has practically no precipitation is the Kalahari Desert in the south, between the western and eastern highlands and the Zambesi and Orange rivers. On the whole, the territory that is removed from the equator has one wet season during the year.

Plant Life. The vegetation of the northern temperate region closely resembles that of southern Europe. The flora of the south temperate zone is isolated and individual, characterized in particular by brilliantly-colored flowering plants and a large variety and extent of heaths. The forests of the northern part consist of oak and smaller trees, such as figs and olives. The date palm is found in the Sahara Desert. In the forests of the equatorial regions the trees often grow to the magnificent height of 200 ft. At their base is a dense jungle formed by parasitic vines, which twine along the trunks of the trees. Through this heavy undergrowth the rays of the sun rarely penetrate. In other parts of Africa there are extensive steppes, prairies and savannas. On the lowland plains grow a number of reeds, such as papyrus, and the drier highlands have abundant pasture grass. Here the principal trees are the wine and oil palms and the baobab. There is an abundant growth of acacias and euphorbias.

Animal Life. The animal life of Africa does not vary greatly in different parts of the continent. In addition to its uniformity, one of the chief characteristics of the fauna is the size of many of its representatives, Africa being the home of the largest members of the animal kingdom, such as the elephant, the rhinoceros, the hippopotamus and the lion. To the Horse Family belong the wild ass, the zebra and the quagga. Okapi, hyraxes, antelopes, gazelles, the chimpanzee, the gorilla and the buffalo are found. There are no camels, llamas, deer, goats or true swine, and practically no wolves, foxes and bears. The giraffe is peculiar to this continent. The ostrich is the most striking bird; the other varieties resemble those of Australia rather than those of Europe or Asia. The fish life bears a close resemblance to that of Europe; the reptiles are numerous, and include the python, the crocodile and many venomous species.

AFRICA

INHABITANTS. Africa is inhabited by representatives of four different races. The Semitic and Hamitic, or the white, are found in the north, and the two black races, the Negro and the Hottentot, in the south. The distinction between the two main divisions of the north and the south is no longer maintained, as invasions have been made, chiefly by the whites of the north, into the southern territory. The Bantu branch of the Negro race inhabits the equatorial regions. There are wide differences between the tribes of the Bantu group; they are scattered over the territory extending from the south of the Sudan to the region of the Hottentots in the southwest, but they resemble one another sufficiently in language and in a few physical characteristics to reveal the fact that they belong to the same family. The Hottentots and the Bushmen live in the southwest. They are alike in several respects, but the Hottentots are generally the taller of the two and occupy an intermediate position between the Bushmen and the negroes. In northern Africa the Hamites represent an older and earlier population than do the Semites.

Various complex schemes of classifying the different races have been attempted. The population is variously estimated at from 140,000,000 to 175,000,000; the number of the inhabitants of the interior is practically unknown.

POLITICAL DIVISIONS. Abyssinia, Liberia and Morocco, with a combined area of 613,000 sq. m., are the only independent nations. With these exceptions the continent is divided among the nations of Europe, as follows: *Great Britain,* Cape of Good Hope, Natal, Basutoland, Bechuanaland Protectorate, Transvaal and Swaziland, Orange Free State, Rhodesia, Nyasaland Protectorate, British East Africa Protectorate, Uganda Protectorate, Zanzibar Protectorate, Somaliland, Northern Nigeria, Southern Nigeria (colony and protectorate), Gold Coast and *hinterland,* Sierre Leone (colony and protectorate), Gambia, Egypt and Libyan Desert, Anglo-Egyptian Sudan—3,701,411 sq. m.

France, Algeria and Algerian Sahara, Tunisia, French West Africa, French Congo, French Somaliland, Madagascar —3,866,950 sq. m.

Under Mandatory Rule, German East Africa, German Southwest Africa, Kamerun, Togoland—910,150 sq. m.

Italy, Eritrea, Italian Somaliland, Tripoli—600,000 sq. m.

Portugal, Guinea, West Africa, East Africa—787,500 sq. m.

Spain, Rio de Oro, Muni River Settlements—79,800 sq. m.

Belgium, Congo State—900,000 sq. m.

Independent States, Liberia, Morocco, Abyssinia—613,000 sq. m.

HISTORY. The history of Egypt represents the most ancient civilization on record. The nation existed when the Roman Empire was founded, and at the time that Carthage was conquered and destroyed by Rome, a large part of the territory was usurped by the Roman Empire, though gradually neglected because of Rome's greater interest in her possessions that lay within the bounds of civilization. Christianity was early introduced. During the time of the Crusades, northern Africa was the scene of many struggles between the Christians and the Mohammedans, but soon the country was more or less forgotten, except by the Arabs, who made a few explorations along the upper Nile.

In 1415 Prince Henry of Portugal, called the Navigator, became interested in the unknown continent and prepared several exploring expeditions. After his death the Portuguese continued their voyage of discovery, and in 1488 Bartholomeu Dias, sailing under the auspices of the King of Portugal, discovered and rounded the Cape of Good Hope. Among the explorers of the 18th century are men of many nationalities. James Bruce, while in Egypt in 1768, determined to find the true source of the Nile and discovered the Blue Nile. In 1795 Mungo Park, a Scotchman, was dispatched by the African Association (an organization founded in 1788 in the interests of the slave traffic and explorations), and he made expeditions through the Niger

country from 1795 to 1797. His last attempt in 1805 ended in his being drowned at Bussa. Other explorers include the famous names of Stanley (See STANLEY, SIR HENRY MORTON) and Livingstone (See LIVINGSTONE, DAVID), as well as Barth, Du Chaillu, Burton, Rohlfs, Nachtigal, Junker, Thomson, Wissman, Lenz and Donaldson Smith. One of the most interesting features of modern activity in Africa is the project of establishing a trunk-line railway from the Cape to Cairo, a scheme which will be of great aid in materializing the plans for the development of the country.

African Methodist Episcopal Church, a branch of the Methodist Episcopal Church organized exclusively for the colored people. It was founded in 1816 in Philadelphia, under the direction of Richard Allen. In 1820 the African Methodist Episcopal Zion Church was organized. Both organizations are independent of the Mother Church, but follow her general rules and polity. The African Methodist Episcopal Church has about 700,000 members; the Zion Church about 600,000 members. See METHODISTS.

Agamem'non, brother of Menelaus and King of Mycenæ, one of the most powerful rulers of his day. In consequence he was general-in-chief of the Greeks during the Trojan War. When Troy fell, disregarding the admonitions of the prophetess Cassandra, who was one of his captives, he returned to Mycenæ, where he was killed by his false queen, Clytemnestra, and her lover, Ægisthus. He was father of Orestes, Iphigenia, Laodice and Chrysothemis. Orestes avenged his father's death by slaying both his murderers.

Agassiz, *Ag' a se,* **Alexander,** (1835-1910), an American naturalist and philanthropist, born in Neuchâtel, Switzerland, son of Louis Agassiz. He came to the United States in 1849. In 1855 he graduated from Harvard, two years later graduated from the Lawrence Scientific School, and subsequently was on the California Coast Survey and associated with his father in the zoological museum at Cambridge, Mass. By 1869 he was president of the Calumet and Hecla Mining Company, from which he amassed a large fortune. On his father's death, in 1874, he became curator of the natural history museum in Cambridge, in which capacity he won world fame. Continuing to engage in important zoological investigations, he was repeatedly the recipient of various prizes and high honors. In 1904 he took "the Agassiz scientific cruise," on which he explored the deep waters off southern and Lower California and the Central and South American states, and of which he defrayed the cost of $75,000, having refused Andrew Carnegie's offer of funds. Throughout his life he contributed generously to scientific bodies. Among the honors conferred on Agassiz were the award of membership in the Order of Merit by the Emperor of Germany and the position of officer of the French Legion of Honor. Moreover, he was foreign member of academies of science of Paris, London, Vienna, Stockholm, Rome, Munich and Copenhagen. His extensive works include *Seaside Studies in Natural History,* which he wrote with his mother.

Agassiz Association, an organization among young people for the advancement of nature study. The society was founded in 1875 by Harlan H. Ballard and named for Louis Agassiz (See AGASSIZ, LOUIS JOHN RUDOLPH). There are over 1000 chapters and more than 10,000 members. The organization offers a correspondence course of instruction on scientific subjects and natural history to its members free of charge, and prizes are awarded for noted achievements in original research. The badge is a Swiss cross. The official organ is *The American Boy* and the headquarters are at Pittsfield, Mass.

Agassiz, Louis John Rudolph, (1807-1873), an eminent naturalist, born in Switzerland, son of a Protestant clergyman. His natural love of the sciences, together with studies at Zürich, Heidelberg and Munich, developed in him an unusual insight into the mysteries of natural history. Specialization in the study of fossil life led to discoveries and new classifications. After holding a professor-

ship at Neuchâtel, he came to America to follow certain lines of research in geology and zoology. He lectured at Harvard University and at Cornell and also at Lowell Institute, and was offered sufficiently attractive inducements to keep him in America. The sum of $50,000 was contributed by a citizen of New York City for the advancing of his work, and an academic position was offered to him. He taught first at Cornell University and later became professor of zoology and geology at Harvard. His researches carried him to Brazil and led to extensive travel in North America, bringing valuable acquisitions to the data of science. He held many views contrary to those prevalent in his day, his opposition to the theory of evolution being the most noteworthy example. His chief writings are *Researches on Fossil Fishes, Glacial Systems, Outlines on Comparative Physiology* and *a Journey to Brazil.*

Ag'ate, a variety of chalcedony and usually characterized by having colored bands arranged parallel to each other. The stone takes a high polish and forms beautiful cabinet specimens. The colors range from white through various shades of red and brown to black. Red predominates, and usually not more than three or four colors are found in one specimen. In the moss agate the color is so distributed as to give the stone a moss-like appearance. Agates are found in many localities, but the commercial supply comes largely from Brazil and Uruguay. See CHALCEDONY.

Agave, *A ga' ve,* an interesting plant or class of plants of the Amaryllis Family and native in southern United States and Mexico. They are always herblike, stemless plants, growing from a fleshy root and bearing a crown of stiff, sword-like leaves, having spiny edges and a pointed apex. The flowers, which mature very slowly, are borne upon a long stalk, that lengthens rapidly after it has begun its growth. The individual flowers are tubular with long stamens, and are often very fragrant. The American agave, century plant or American aloe, is probably the best known, as it is often cultivated as a porch or house plant. The name century plant was given because of the tradition that its blossoms took 100 years to develop; the time necessary for them to reach maturity, however, depends upon conditions of soil and climate. As it grows, the plant is storing up nourishment for the time of flowering, and with the beginning of the flower stalk there is a sudden rising of the sap which causes the stalk to grow with comparative rapidity. The leaves, having accomplished their life purpose, wither, and the entire plant, after the development of the fruit, dies. The juice of the plant at the time of the lengthening of the stalk is made use of by the Mexicans in making a fermented drink called pulque (See PULQUE). The leaves produce a fiber used in making rope and coarse cloth, and their juice is used in making soap.

A'gent, one who is employed to represent or act for another person, company or corporation known as the principal. The principal is responsible for the acts of an agent whenever he has put him in a position such that strangers, relying upon appearances and acting in good faith, may properly assume that he has the authority which his position would imply. A special agent is assumed to have limited authority; a general agent, greater powers. An agent may not delegate his authority to a third person, and is liable to his principal for the acts of those whom he employs. He is also liable for disobedience of instructions, and for any failure to exercise ordinary care and diligence in the performance of duties assigned to, or naturally devolving upon, him. The agent is entitled to compensation for his services, for the reasonable expenses of his agency and for personal loss or damage while acting within his instructions.

Agincourt, *Ah" zhahn koor',* **Battle of,** a famous battle of the Hundred Years' War, fought near Agincourt, France, on Oct. 25, 1415. The English, under Henry V, had invaded France and taken Harfleur. Setting out for Calais, Henry found a French army of 50,000 men opposing his army of 14,000. In the battle

which followed, the English won a complete victory, due to the brilliant work of their archers, against whom the heavily armored French knights could not prevail. The English loss was 1000; the French, about 10,000.

Agnos'ticism, a doctrine held by those who believe that the existence of a personal God or an invisible world can neither be proved nor disproved. Agnostics also maintain that no one can prove his own existence. The foundation of this doctrine is the failure of science to ascertain the first causes of natural phenomena, and the inability of the human mind to arrive at absolute conclusions. The philosophy of the ancient Sophists was a form of Agnosticism. See SOPHISTS.

Agnus Dei, *Ag'nus De'i,* (Latin, Lamb of God), the name applied to a certain prayer in the Roman Catholic mass service. In *John 1, 29,* this title is used by Christ. The figure of a lamb bearing a cross, stamped upon an oval of wax, silver or gold, is also called an Agnus Dei. Since the 14th century such medals have been consecrated by the popes and distributed among the faithful on the first Sunday after Easter. In early times similar medals of wax were worn by candidates for baptism, as objects of reverence. Agnus Dei is also applied, in the Greek Church, to the cloth which covers the cup in the communion service. This cloth bears the image of a lamb.

Agouti, *A goo' ty,* a small South American Rodent, somewhat similar to the porcupines and, by most authorities, classed in the Porcupine Family. There are two principal representatives of the class; one, well known in former times, was peculiar in loving the hot sun and wandering chiefly by day. The species now best known is nocturnal and lies by day in its home in a hollow tree. These agoutis have squirrel-like heads, but rat-like bodies, with high, rounding haunches and slender limbs. The fur is yellow-brown, striped or flecked with lighter color and lengthened at the back into coarse bristles. They are clever little animals, readily tamed but so prized for their flesh among the South Americans that they are hunted and have learned many foxlike tricks to escape pursuit. Their food is chiefly ferns, roots and fallen fruits.

Agra, *Ah' grah,* a city of India, capital of the Province of Agra, 841 m. n. w. of Calcutta and 110 m. s. e. of Delhi. Agra is an important railway center and has an extensive trade in cotton, grain, sugar and tobacco. The inlaid mosaics made by the inhabitants have a world-wide reputation. Agra is the oldest city in India and is celebrated for its Pearl Mosque and the Taj Mahal, which has been called the most beautiful building in the world (See TAJ MAHAL). Population, about 190,000.

Agri'cola, Gnæus Julius (37-93), Roman statesman and general. He was made governor of Britain, conquered the greater part of the island, built a line of forts from the Forth to the Clyde and reconciled the Britons to the Roman rule. The Emperor Domitian, jealous of his success, called him back to Rome, where he lived in retirement until he died in 93. His son-in-law, Tacitus, wrote an enthusiastic history of his life.

Ag"ricul'tural College, a college whose object is the study of scientific and practical agriculture. In the United States the foundation of such colleges by grants of land from the Federal Government was first discussed in 1857. The arguments then given opposing the measure were of such seeming weight that the bill was not passed until brought up again in 1862, when it finally became a law. In the words of the act its purpose was the granting of land to establish colleges "where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." Since the passage of this act, which has been variously

amended to supply appropriations for the growing needs of these schools, there have been established in each of the various states agricultural colleges which are to a certain extent depending upon state and Federal aid. In addition to these are many privately endowed colleges, and normal colleges giving training in agricultural teaching.

The first state agricultural college in the United States was that established in Michigan in 1857 in connection with the state university. At present there is a state agricultural college in each state of the Union. As the name indicates, the object of these schools is to give training in agriculture, the term being used in its broadest sense. The necessity of making the soil more productive or at least making it retain its present productivity in order to feed the constantly increasing population of the earth, has become so evident that it need be the only argument offered for scientific agricultural education. Agricultural colleges offer courses in all lines of biological work, including horticulture, forestry, entomology, pomology, etc. At the same time classical subjects are not wholly omitted and military tactics may be taught by an army officer detailed by the president for that purpose, in case the school has provision for not less than 150 male students.

In Europe, where nearly 70 per cent of the population depend directly upon the farms for their livelihood, agricultural colleges have been in existence for more than a century. At present there are hundreds of such colleges upon the Continent, while numerous other schools similar in purpose, if not in name, are carrying on the same work. See AGRICULTURAL EXTENSION WORK; AGRICULTURAL EXPERIMENT STATIONS.

Agricultural Experiment Stations, stations which have been established in each state of the United States for the purpose of carrying on investigations along agricultural lines. They were instituted by an act of Congress of 1887, which provided for their establishment under the direction of the various state agricultural colleges or the agricultural departments of state schools, and to assist them an annual appropriation of $15,000 was made to each. Their purposes, as set down in the act, are: "to conduct original researches or verify experiments on the physiology of plants and animals; to study the diseases to which they are subject and their remedies; to investigate the chemical composition of useful plants, the comparative advantages of rotative cropping, the capacity of new plants or trees for acclimation, the chemical composition of manures, the adaptation and value of grasses and forage plants, the composition and digestibility of foods for domestic animals, and questions involved in the production of dairy products or other agricultural problems."

To make the work of the stations of the different states uniform in character, the secretary of agriculture of the United States furnishes forms for the tabulation of results of the experiments and also suggests lines along which he thinks investigations might be profitably conducted. An act of 1906 added $5000 to the annual appropriation granted by the United States, with an increase of $2000 every two years until the annual appropriation amounts to $30,000. This appropriation is to be provided from the sale of public lands. Further, in 1912, Congress established experiment stations in Alaska, Hawaii, Porto Rico and Guam. Each experiment station is required to furnish bulletins of its work at least once in three months to every newspaper of the state and to every individual engaged in farming in the state who may make request for them. Experiment stations have already been established in all the states and are proving of inestimable value to the farmers of their districts.

Agricultural Extension Work, a means of spreading to the farmers at their farms and homes the knowledge gained by the state and Federal departments of agriculture and by the colleges and experiment stations. The rapid advance of scientific agricultural knowledge was of no practical benefit unless it

could be conveyed to the farmers who were actually working the soil and producing the crops. Otherwise the spread of new methods of agriculture would be very slow. The first means devised to bring this knowledge to those who could put it into immediate, practical use was the farmers' institute (See FARMERS' INSTITUTES). In 1903 a farmers' institute specialist was put in charge of a central department in the Federal Office of Experiment Stations, and his duties were the investigation of all problems connected with such organizations and the dissemination, through them, of agricultural education.

In 1905 the Association of American Agricultural Colleges and Experiment Stations appointed a standing committee upon extension work which was to cooperate with the United States Department of Agriculture in extending agricultural education. Since this committee was established, nearly 450 members of college faculties and experiment station staffs have been annually engaged in institute work. Twenty-six states have departments for extension work and many states have large appropriations for its advance.

There are three typical methods by which the extension work is carried on. One, illustrated in the State of Iowa, is by establishing a department of agricultural extension as a department of the state agricultural college. Its head ranks with other members of the faculty, and the college pays the salaries of all instructors in the department, while the communities visited pay the traveling expenses. The second method is by making agricultural extension a department of the experiment station. The extension division has then an executive whose salary and those of his assistants are paid from state appropriations. This method is in use in Indiana. In other states, notably Ohio, the extension work is a department of the college of agriculture of the university and its head is a member of the faculty. Under each of these methods of organization courses of instruction in subjects pertaining to agriculture are offered by members of the faculty, who go from locality to locality carrying with them their libraries and their laboratories and offering the same work as they give upon the campus. Generally only one school is held in a county and that of but one week's duration. Many state extension departments also give instruction and demonstrations at fairs, institutes, granges, clubs and any organizations where such knowledge may be spread.

Information concerning agricultural extension work may be secured from the United States Department of Agriculture, Office of Experiment Stations, *Circular 98,* and from the various state departments of agriculture.

Agriculture in High Schools. It was not until thirty years after the establishment of the first agricultural colleges that the first successful agricultural high school was established. This was in 1888, in connection with the University of Minnesota. Though its success was immediate, by 1898 there were only ten secondary schools giving agricultural instruction. Since that date, however, there has been a great expansion, and in 1919 most of the state agricultural colleges had agricultural high schools in connection with them. The land-grant colleges for negroes in the Southern states, moreover, though organized as colleges, are yet hardly more than secondary schools. Agricultural courses are also offered in many state and county normal schools, but the object of this instruction is to prepare teachers for elementary schools rather than to make successful farmers.

The independent agricultural high schools are of two classes, either district or county schools. Alabama, which was the first to establish district high schools, now has one for each Congressional district. Georgia, Virginia and Minnesota are other states which have adopted the district system. Wisconsin, on the other hand, was the first to adopt the county plan, by which the state aids the agricultural high school established by any county. This system has also been

adopted in Michigan, Maryland and Mississippi, but the experience of these states seems to indicate that in most states the county is too small a unit to bear the expense of a good high school in which only agriculture is taught. The natural compromise is to teach agriculture in the regular high schools, and this plan has been tried in practically all the remaining states.

It is noteworthy that everywhere the use of land for instructional purposes is increasing. Nearly all schools require some actual farm practice in connection with the school work, and many of the schools operate their own demonstration farms. Another feature is the increased use of the home-project method, in which the student is required to do a certain amount of practical farming at home. This work is inspected and is credited to him in addition to his school work.

Agricultural Journals, magazines and papers devoted to the spread of agricultural information. They are of great value to the farmer, to whom they give report of the latest inventions and improvements in farm methods and machinery and helpful advice in regard to farm management, crops, etc. A leading agricultural authority recommends the appended list of journals as especially helpful. For the New England States and Middle East: *Rural New Yorker* (Weekly), New York City; *Country Gentleman* (Weekly), Philadelphia, Pa.; *American Agriculturist* (Weekly), New York City; *New England Homestead* (Weekly), Springfield, Mass. For the South Atlantic and Gulf states: *Progressive Farmer* (Weekly), Raleigh, N. C.; *Southern Cultivator* (Semimonthly), Atlanta, Ga.; *Progressive Farmer and Southern Farm Gazette* (Weekly), Starkville, Miss.; *Rice Journal and Southern Farmer* (Monthly), Crowley, La. For Central and Western states: *Farm and Ranch* (Weekly), Dallas, Tex.; *Orange Judd Farmer,* Chicago, Ill.; *Prairie Farmer,* Chicago, Ill.; *Homestead* (Weekly), Des Moines, Iowa; *Wallace's Farm* (Weekly), Des Moines, Iowa; *Northwest Pacific Farmer* (Weekly), Portland, Ore.; *Field and Farm* (Weekly), Denver, Colo.; *Breeders' Gazette* (Weekly), Chicago, Ill.; *Reliable Poultry Journal* (Monthly), Quincy, Ill.

Ag"ricul'ture, the occupation of the tilling of the soil for the production of crops. It is one of the oldest of occupations, since it is necessary to the life of man, and has been practiced to some extent in all countries and to a great extent in most. The raising of grain and the cultivation of the land for that purpose has been carried on in Eastern countries as far back as there is record of the country, and it is an interesting fact that seeds of grain buried in the Pyramids thousands of years ago are very similar to the wheat we have today. Although the tilling of the soil was not considered among the highest occupations, ancient writers have given time and attention to it, and we have preserved to us many of their suggestions, often strikingly applicable to modern conditions. The countries of temperate climates have naturally led in agricultural pursuits, since in the North, growing seasons are short, and hunting, lumbering, etc., have proved more profitable, while in the tropical regions vegetation has been so plentiful as to render cultivation less necessary.

Production has been increased many fold; new and better varieties of grains, vegetables, fruits and live stock are being constantly produced; and the use of agricultural machinery has enabled the farmer to give more attention to the business side of his affairs.

It is only in comparatively recent years that scientific agriculture has been practiced, and the great industry, which is the foundation of the life of the world, has been raised to the rank of a profession. In the eight leading industrial countries agriculture is the chief occupaton. In Hungary 70 per cent of the occupied population are employed in agricultural pursuits; in Italy, 59 per cent; in France, 41 per cent; in the United

States, 36 per cent; in Germany, 35 per cent; in Belgium, 21 per cent; in Great Britain, 12 per cent.

In the United States, although the increase in population between the last censuses was 21 per cent, the increase in number of farms was only ten per cent. The area and value of improved land has, however, increased remarkably. Along with this increase in value has come a decrease in the rural population. The total acreage of farms in the United States is about 900,000,000, with an average of 138 acres to a farm; about 55 per cent of this is improved land. As near as can be estimated the value of the lands and buildings is fifty to sixty billions. The average value of the land and buildings per acre is $51.26. The largest number of farms, 1,513,000, contain from 100 to 174 acres, while there are nearly 50,000 farms of 1000 acres or over and nearly 9000 of less than 20 acres.

The International Institute of Agriculture at Rome estimates the average world's crop production as follows: wheat, 4,127,685,000 bushels; rye, 1,577,490,000 bushels; barley, 1,522,732,000 bushels; oats, 4,362,713,000 bushels; corn, 4,201,589,000 bushels.

For other articles allied with agriculture see: AGRICULTURE, DEPARTMENT OF; SOIL; DAIRY HUSBANDRY; AGRICULTURAL COLLEGE; AGRICULTURAL EXTENSION WORK; AGRICULTURAL EXPERIMENT STATIONS; RANCHING; DRY FARMING; FORESTRY; IRRIGATION.

Agriculture, Department of, an executive department of the United States first established as a branch of the department of the interior in 1862. In 1889 it was organized as a separate department and the secretary of agriculture became the eighth member of the president's cabinet. The best-known bureaus of this department are as follows: bureau of animal industry, bureau of chemistry, bureau of entomology, bureau of biological survey, bureau of forest service, bureau of plant industry, bureau of statistics, bureau of soils, weather bureau, division of publications, office of public roads inquiry, office of experiment stations. All of these publish interesting and valuable literature, which may be had upon application through your congressman, or directly through the secretary of agriculture at Washington, D. C.

The object of the department is the spread of a better knowledge of agriculture in the broadest sense and the improvement of methods in all lines of work. To accomplish this, experiment stations have been established, which are investigating the soils of all sections of the country, attempting to determine the crops best fitted for each and studying the improvement of stock, the preservation of forests, climatic conditions and the improvement of plants. These are but a few of the lines of work taken up, and the good already done to agriculture has been to put it upon a scientific basis and raise it to the standard of a profession (See AGRICULTURAL EXPERIMENT STATIONS).

The recently established bureau of forestry is one of the most interesting and rapidly growing departments, probably because of its achievements in the short period since its establishment. See FORESTRY.

Agriculture in Common Schools. The rapid growth of agricultural colleges and the popularity of agricultural courses in high schools has led in the United States to a demand for a foundation course in rural schools leading up to the advanced work. The demand, followed by the immediate appearance of suitable texts and training courses in agriculture for rural school teachers, has resulted in legislation in many states requiring the teaching of agriculture in all rural and village schools and the adoption of textbooks for that purpose. Although the United States Department of Agriculture admits itself unable to keep accurately informed as to the number of schools offering elementary courses in agriculture, since the increase is so rapid, it estimates, from the number of states requiring agricultural training for teachers and adopting texts on agriculture, that the number of schools which

do not require such courses is comparatively small. Alabama, North Carolina, Tennessee and other states have adopted uniform texts in this subject in their rural schools; and every city and county in Virginia, the majority of counties in Maryland, a number of counties in California and a number of counties of Florida have adopted texts for regular use. Elsewhere instruction is given according to the needs of the community.

The course suggested by the Missouri State Board of Agriculture, and followed in general by schools offering such instruction, begins with elementary work in nature study. This is followed by studies of: (1) *soils,* the kinds, their origin and composition, improvement, plant food, rotation of crops, etc.; (2) *roads,* their drainage, laws governing their care, artificial roads, etc.; (3) *seeds,* their selection, germination, vitality, etc.; (4) *plants,* their classification, parts, etc.; (5) *orcharding and gardening;* (6) *stock raising and feeding;* and (7) *insects.* The study of these departments should be carried on by experiments both at home and at school, by the study of texts and bulletins, and by school gardens connected with school grounds. Some schools add elementary courses in rural engineering, which includes the study of the best types of farm buildings and fences, the disposal of sewage, the care of farm machinery and the importance of a hygienic water supply, and courses in rural economics which take up marketing and farm accounts.

The obstacles which have hitherto served to hinder the advance of rural agricultural education are the apathy of school officers, the lack of suitable texts and of trained teachers, the shortness of the school term, which does not permit the completion of experiments, the numerous courses already offered, which take up all the time of the day, and the shifting of teachers from school to school. Many of these hindrances are being overcome and the result is the dignifying of a familiar industry and rapid improvement in farm methods. See Agricultural Extension Work; Agricultural High School; Boys and Girls Club.

Agricultural Credits. Conditions of isolation and economic disadvantage have forced the American farmer to pay exhorbitant rates of interest. To secure a lessening of these charges The Federal farm Loan act of 1916 authorized the formation of 12 Federal land banks empowered to lend funds and sell bonds. Farmers in any locality can form a loan association, members of which secure loans by mortgaging their farm property. The association secures funds by assigning the mortgages to the land bank, and the bank secures needed funds by selling bonds based on the mortgages as security. Under this system, capital flows to agricultural centers. Any reliable farmer can secure needed funds on favorable terms of repayment and at low rates of interest.

Aguinaldo, *Ah" ge nahl' do,* **Emilio** (1870-), the leader of the Filipino insurrection against the United States in 1899. He was educated at the University of Manila, where he studied medicine. Later he went to Hong Kong and served for a time in the Chinese army and on a Chinese warship under European instructors. He assisted the American forces in gaining possession of the Philippines, but led the revolt when he learned that the islands were not to be given an independent government at once. After a warfare lasting three years Aguinaldo was captured and retired to private life.

A'hab, the son and successor of Omri and the seventh King of Israel. He reigned from about 875 to 853 B. C. The most evil of all the Israelitish monarchs, according to Scriptures, at the instigation of Jezebel, his wife, he established the worship of Baal and endeavored to wipe out the true religion.

Ahasuerus, *A has" u e' rus.* The name of the Persian king in the book of Esther. (See Story of Esther in Bible Stories.) Supposed to be the same as Xerxes I. There are references in the Bible to two other kings by this name, one in Ezra iv:6

is supposed to refer to Cambyses, son of Cyrus. The other in Daniel ix:1 is supposed to refer to Astyages.

Ah'rens, Carl (1867-), a Canadian landscape painter, born in Ontario, of Norseman descent. He studied art under William Chase, Edwin Elwell and George Inness of New York. His *The Day Is Done* was favorably noticed in 1890, *The Fisherman's Child* had the place of honor in an exhibition of the Royal Canadian Academy in 1893, and his *Ripe Corn Time* was purchased by the government and placed in the Parliament Buildings, Toronto, in 1896. Attracted by this same picture, Elbert Hubbard persuaded the artist to join his lot with the Roycroft community in East Aurora, N. Y. Later Ahrens painted the ruined missions of southern California for three years, returning to Canada in 1907. Besides those works above mentioned, he is known for his *Cradled in the Net,* which he showed at the World's Fair in Chicago, *The House in the Clearing, Gleam in the Woodlands, The Woodcutters, The Coming Storm, Passing Showers* and *The Glow in the Woodland.*

Aino, *I' no,* or **Ainu,** *I' noo,* a native uncivilized people inhabiting the Japanese Island of Yezzo and Sakhalin and the Kurile Islands. They are short of stature, averaging less than five feet in height, but are strong and active. Their hair is black and covers most of the face and the entire body. Their complexion is dark brown. By some the Aino are believed to be the original inhabitants of Japan.

Ains'worth, William Harrison (1805-1882), novelist, born in England. He contributed to the *London Magazine* and other periodicals, and in 1826 opened a publishing house in London. In 1842 he founded *Ainsworth's Magazine.* He has written many stories depicting fashionable life. In most of his works the historical element, together with the scenery of his country, are prominent, and he depicts scenes and incidents with vividness and directness. Some of his novels are *Sir John Chiverton, Rookwood* and *Star Chamber.* Other writings are *Merrie England, Cardinal Pole, Beau Nash* and *John Law, the Projector.*

Air, the gaseous mixture which surrounds the earth. It is composed principally of oxygen and nitrogen, but has recently been found to contain the new elements, helium, argon, krypton, neon and xenon, in small quantities. Air generally contains one part of oxygen and four parts of nitrogen by volume, but is known to be a mixture of these gases rather than a compound, because its composition varies slightly under different conditions; also, if four volumes of nitrogen and one of oxygen are mixed, air is formed without a change of temperature, which generally accompanies chemical action. Although all animals are constantly taking up the oxygen of the air and leaving the nitrogen, which has served only to dilute the oxygen, the composition of the air varies only slightly, because green plants give off oxygen.

Besides nitrogen, oxygen and other gases already mentioned, air normally contains water vapor and carbon dioxide, both varying in quantity and both important to plants and animals. The quantity of water vapor which the air can hold is limited, and the limit depends on temperature; the higher the temperature, the greater the quantity of water vapor possible. Air full of water vapor is said to be saturated. The condition of the air as to moisture has much to do with the comfort of human beings. Forty per cent is rather low and 80 per cent rather high for moisture conditions. Carbon dioxide is passed into the air as a waste product from the lungs of animals and is taken out of the air by plants as their essential food. The accumulation of moisture and of carbon dioxide and other matter given off by lungs and skin causes unwholesome conditions, making necessary the ventilation of confined spaces.

The height to which the atmosphere extends is not definitely known, but at a distance of 80 m. it is estimated to have a comparatively low density. In some places it is thought to extend to a height

of 200 m. The ordinary pressure of the air at the earth's surface is 15 lb. to the square inch.

Air was primarily thought to be one of four elements out of which all substances were formed. The other three were earth, flame and water. See ATMOSPHERE.

Air Brake, a brake operated by compressed air and used for stopping cars. Air brakes are in general use on railway and electric cars. The device for operating the brake consists of: an air compressor, which on steam railways is operated by steam from the locomotive, and on electric cars by an electric motor; a main reservoir, in which the compressed air is stored; air reservoirs attached to each car; a brake cylinder, in which there is an air-tight piston; pipes leading from the main reservoirs of each car and from these to the brake cylinder; and a triple valve for operating the brakes. The pipes which supply the compressed air are connected between cars by rubber tubes.

The air is compressed until it has a pressure of 90 to 100 lb. per square inch. The triple valve by which the brakes are operated is, in the locomotive, within easy reach of the engineer, and in the electric car directly in front of the motorman. By opening this valve air is let into the brake cylinders. The pressure of the air forces the piston to one end of the brake cylinder, and this piston is attached to a lever, which sets the brake. The brakes are released by feeding more air into the cylinder and increasing the pressure until the balanced valve opens in the opposite direction and allows the compressed air to escape. The brakes on all the cars in a train are set or released at once, and the air compressor works automatically so that a uniform pressure is always maintained in the main reservoir. See AIR COMPRESSOR; WESTINGHOUSE, GEORGE.

Air Compressor, an air pump specially constructed for compressing air. The common bicycle pump is a simple form of air compressor, in which there is a valve at the bottom of the cylinder opening outward, and in the piston is a valve opening downward. The cylinder is filled with air when the piston is raised; the piston valve is closed when the piston is forced downward, and the cylinder valve is at the same time forced open and the compressed air driven out. Whatever the size of an air compressor, it operates on this principle. The air is usually forced into an iron tank called a receiver, and it is often found desirable for the purpose of economy to heat the air in a stovelike heater before using. When large compressors are employed, they are operated by water power, steam engines and electric motors.

Compressed air is used extensively for supplying power to operate machine tools much as steam is employed in driving a steam engine. While the usual air compressor will compress air to 80 lb. to the square inch in a single operation, this pressure can best be increased by having a second compressor to take the air at this pressure and compress it still further, and so on until high pressures are obtained. In compressing air it is essential that the cylinder of the air compressor be provided with cooling devices, which generally are in the form of a cold-water circulating system. See AIR; PNEUMATIC TOOLS.

Air Engine, an engine in which air is used for the motive power. There are two types, those which use compressed air and those which use heated air. Those of the first type are similar in construction and operation to the steam engine. Hot-air engines are used where a low power is sufficient to do the required work, such as pumping water, running small printing presses, feed cutters and other similar machines. They operate on the principle of expansion of heated air. Since this expansion is comparatively slight, the cylinders and pistons of hot-air engines are much larger than those of steam engines; otherwise they operate on the same principle as the steam engine. Compressed-air engines are used in operating machine drills, riveters and other machine tools. See

AIR COMPRESSOR; PNEUMATIC TOOLS; STEAM ENGINE.

Air Gun, a gun in which condensed air is used as the projectile power. The range of the air gun is short, from 180 to 250 ft., and its force not nearly equal to that of guns where powder is used. The air is compressed in a chamber and released behind the bullet by a trigger. In some arrangements by releasing the trigger at once upon pulling it, the air chamber is closed after each shot before all the air has escaped, so that several shots may be fired in succession without recharging the chamber. The *Vesuvius,* a United States warship, was equipped with three air guns for throwing projectiles charged with high explosives.

Air Plants, or **Epiphytes,** *Ep' i fites,* plants which have no root connection with the ground and which, consequently, live by means of food and moisture taken from the air. These plants hang from the branches of other plants but are never parasites upon them. They are generally tropical plants, for in the warmer climes the air contains the most

AIR PLANTS

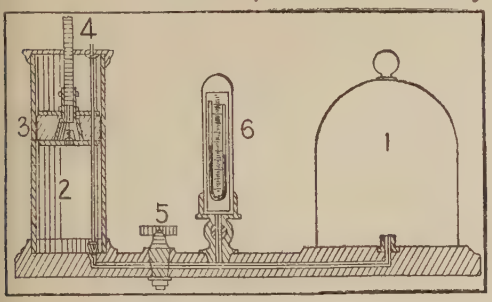
moisture. The so-called roots of the air plants are of peculiar structure and have widely differing duties. They are constructed in such a manner that in time of rain they can take up moisture rapidly and resist drying in time of drought; for this purpose the ends of the roots have a thin absorbent layer capable of hardening in dry weather. Some aerial roots grow to the ground and then become true roots by laying aside the papery layer; others turn away from the light and are comparatively short; still others function as leaves and so contain the green coloring matter, chlorophyll, which converts the carbon dioxide of the air into starch.

Spanish moss is the only air plant which grows commonly in the United States; its gray, mosslike fibers hang in quantities from the trees of Southern forests. In tropical countries the air plants are held in great reverence and are planted upon the roofs of churches both as ornaments and as offerings. Air plants belong to no one particular family but are palms, orchids, mosses, arums and lilies; probably the greatest number belong to the Orchid Family.

Air Pump, an instrument by which air may be almost entirely removed from a vessel. It was invented in 1650 by a German scientist and is usually constructed according to the plan given below. A bell jar, known as the receiver (1), having a finely-ground edge, is inverted over a smoothly-polished brass plate with an opening in the center. This opening connects by a tube with a barrel (2), in which an air-tight piston (3) is alternately raised and lowered by the action of a piston rod (4) held vertical by means of a guide. The piston rod is worked by an ordinary lever, or pump handle. There are three valves, all opening upwards, the first at the top of the barrel, the second in the piston and the third at the bottom of the barrel. A stopcock (5) shuts off the tube when the air has been exhausted from the receiver.

When the piston is lowered, the pressure of the air below closes the third valve and opens the second, thus forcing the air through the piston into the upper compartment of the barrel, from whence it is allowed to escape. The raising of the piston closes the valve of the piston by pressure from above, but opens the third valve, thus allowing the air from the tube and from the receiver to enter the lower compartment. As the piston is alternately raised and lowered the process is repeated until the air is practically removed from the receiver. This however, can never be fully accom-

plished. In some air pumps the action of the valves is controlled by the action of the lever. Others have, in addition to the parts mentioned, a gauge (6) consisting of a graduated U-tube, one end of which is closed; it contains mercury and communicates with the receiver by



AIR PUMP

means of a stopcock. Before any of the air has been pumped from the receiver, its force it greater than the weight of the mercury in the closed tube. As the air is exhausted the force lessens and the mercury sinks in the closed tube until it finally stands nearly level in the two arms of the tube. Could the air all be exhausted it would stand exactly level in the two.

By means of the air pump, many interesting facts in physics and chemistry can be demonstrated,—such as that air possesses weight, it is the principal medium for the transference of sound, and air—or rather oxygen—is essential to combustion and of life itself.

Airship. See AERONAUTICS.

Aisne River, The, *Ain.* One of the small rivers in northeastern France, a tributary of the Oise River into which it empties at Compiegne. It came into notice during the World War. The German forces retreated into this river after their defeat in the first Battle of the Marne, and trench warfare began in the extensive system of trenches there prepared. It became prominent again in 1918. American forces were engaged in battles in the vicinity of this river.

See WORLD WAR.

Aix-la-Chapelle, *Aks" lah shah" pel',* **Treaties of.** Three congresses have been held in Aix-la-Chapelle, during the years 1668, 1748 and 1818. The first treaty was concluded May 2, 1668, and ended the war carried on between France and Spain for the possession of Spanish Netherlands. After the death of Philip IV, Louis XIV laid claim to the greater portion of these territories in the name of his wife, who was King Philip's daughter, urging the law of succession respecting private property. To check this act a triple alliance was formed between England, Holland and Sweden, and a treaty was concluded in 1668 by which France retained possession of the fortress of Charleroi and Lille, and returned Franche Compté to Spain.

The second peace of Aix-la-Chapelle concluded the War of the Austrian Succession in 1748. The cause of the war was the dispute of the claim of Marie Theresa to the Austrian throne, and all the great powers of Europe were involved. The definite treaty was signed on Oct. 18, and by its terms all the states held nearly the same possessions as before.

The Congress, or Conference, of Aix-la-Chapelle held in 1818 was chiefly to regulate the affairs of Europe after the wars of Napoleon. Among the great statesmen present were Metternich, Wellington and Richelieu. The chief thing accomplished was the recognition of France as one of the great powers of Europe on her agreeing to the Holy Alliance.

A'jax, in mythology the name of two Greek warriors, the Greater and the Less. Ajax the Greater was the son of Telamon, King of Salamis. Ajax was the strongest Grecian warrior next after Achilles, and was called the bulwark of the Greeks. He commanded 12 ships in the Trojan War and upon the death of Achilles laid claim to that champion's arms, which were, however, awarded to his rival, Ulysses. This injustice drove him insane. In his frenzy he killed all the sheep of the Greeks, under the delusion that they were the followers of

Ulysses, after which he killed himself. The story is told by Sophocles in *Ajax*.

Ajax the Less sailed against Troy with 40 Locrian ships. He was the son of Oileus, King of the Locrians, and was the fleetest runner of all the Greeks except Achilles. His brutal treatment of Cassandra, a prophetess of Troy, after she had taken refuge in the Temple of Minerva upon the fall of her city, caused him to be brought before Ulysses. He escaped punishment from the King, but the goddess of the temple caused him to be wrecked and drowned at sea.

A'kabah, Gulf of, an inlet at the northern extremity of the Red Sea. The Peninsula of Sinai bounds it on the west. It is about 100 m. long and its width varies from 12 to 17 m. The shores are steep, and numerous coral reefs and sudden windstorms endanger navigation. Golden Port is a harbor on the west shore.

A'kron, Ohio, a city and the county seat of Summit Co., 35 m. s. e. of Cleveland and 130 m. n. e. of Columbus, on the Ohio Canal, on the Little Cuyahoga River and on the Erie, the Baltimore & Ohio, the Pennsylvania, the Northern Ohio and the Akron, Canton & Youngstown railroads. Interurban electric lines connect the city with Cleveland, Canton, Barberton and other near-by towns and cities. Akron is situated 1000 ft. above sea level and is surrounded by a chain of lakes which makes the city an attractive summer resort. Extensive beds of fire and pottery clay are found in the vicinity. Natural gas is piped from the Ohio and West Virginia fields, giving facilities in the way of fuel for manufacturing purposes, in addition to the cheap coal from the Ohio, Pennsylvania and West Virginia mines.

PUBLIC BUILDINGS. Among the noteworthy buildings are the Summit County Courthouse, public library, Portage Hotel, Colonial Theater, post office and Y. M. C. A. Building. There are many churches and handsome residences.

INSTITUTIONS. The leading educational institution is Municipal University, opened in 1872 and named in honor of its liberal benefactor, John R. Buchtel. This institution is coeducational. There are also public and parish schools, four high schools and a public library. The city maintains a hospital and a number of charitable institutions.

INDUSTRIES. The situation of Akron is advantageous for manufacturing and it has an active trade in grain, coal and dairy products. It is the largest rubber-manufacturing center in the world. Among the other manufacturing industries are printing and lithographing works, hoisting- and mining-machinery works, manufactories of agricultural implements, pottery, sewer pipe, twine, furnaces, cordage, cereals, boilers, castings, edge tools, terra cotta and flour and gristmill products. The largest match factory in the world is located at Barberton, the southern suburb of the city.

HISTORY. The first settlement was made in 1807, but the growth of the place dates from the location of the Ohio Canal in 1825. Akron was once the home of John Brown, and his former dwelling is still standing where the councils in the abolition cause were held (See BROWN, JOHN). Akron was incorporated as a village in 1836 and as a city in 1865. Population in 1920, 208,435.

Alabama, THE COTTON STATE, one of the Gulf States, is bounded on the n. by Tennessee, on the e. by Georgia, on the s. by Florida and the Gulf of Mexico and on the w. by Mississippi.

SIZE. The extreme length from north to south is 336 m. and the greatest width from east to west is 200 m. The area is 51,998 sq. m., of which 719 sq. m. are water. Alabama is smaller than Georgia, larger than Mississippi and about the size of Maine, New Hampshire and Vermont combined. It is the 28th state in area.

POPULATION. The population in 1920 was 2,348,174. From 1910 to 1920 there was a gain in population of 210,081, or 9.8 per cent. There are 45.8 inhabitants to the square mile and the state's rank in population is 18.

SURFACE. The northern part of the state is traversed by the Tennessee Val-

ley, which is broken into broad tablelands by numerous small rivers.

South of this valley on the east are spurs of the Appalachian Mountains, which enter the state from Georgia. Among these the Raccoon Mountains and the Lookout Mountains are the most prominent, but at no point do they exceed 1800 ft. in altitude. The Raccoon Mountains, after extending into the state about 60 m., sink to the low hills of the Warrior Coal Basin.

Adjoining the plateau on the southeast is the Coosa, or Appalachian, Valley. The region is characterized by parallel ridges of hard cherty limestone and sandstone which have been left standing by erosion. Southeast of this valley is the Piedmont, or Ashland, Plateau, which occupies a small triangular section having a gently undulating surface with an average elevation of about 800 ft.

To the southwest of the Raccoon and Lookout mountains is a region of low hills in which most of the coal and iron of the state occur. The remainder of the state, consisting of the southern part and extending northward along the western border, comprises a section of the Coastal Plain common to all the Atlantic and Gulf states. This is lowland possessing a soil of moderate fertility and crossed here and there by foothills which in the central part of the state descend to rolling prairies.

Rivers. The Tennessee drains the Cumberland Plateau and Tennessee Valley into the Ohio. All other parts of the state are drained to the southwest. Of the rivers flowing into the Gulf of Mexico, the Alabama, formed by the junction of the Coosa and the Tallapoosa, is the most important. This stream and its tributaries drain the eastern and most of the southern portions of the state. The Tombigbee in the west, with its chief tributary, the Black Warrior, drains the Warrior Coal Fields and the western part of the Coastal Plain. This stream unites with the Alabama about 45 m. above Mobile Bay to form the Mobile River. The southeastern section is drained by the Chattahoochee, which forms about one-half of the boundary between Alabama and Georgia, and by a few smaller streams.

Climate. In the northern part of the state and on the higher altitudes the climate may be characterized as warm temperate, and in the lowlands of the southern part as subtropical. Here the heat of summer is tempered by winds from the Gulf, and in the uplands of the northern portion it is relieved by the altitude. The mean annual temperature is highest in the southwest. The elevated regions in the northeast have an equable and pleasant temperature throughout the year, and are becoming noted as health resorts during the winter.

Snow seldom falls in the southern portion of the state, but in the northern portions snowstorms are likely to occur during January and February. The snow, however, quickly disappears. Evenly distributed over the state, the annual rainfall is about 52 inches. The heaviest rains occur in February and the months immediately following.

Minerals and Mining. Coal was discovered in Alabama in 1834. The most productive mines are in Jefferson, Walker and Bibb counties. Since 1880 coal mining has developed with great rapidity until now Alabama is the sixth coal-producing state of the Union. Extensive deposits of iron ore occur in the north-central part of the state, the chief variety being red hematite. Within the last few years the iron industry has grown to large proportions, making Alabama the third state in the Union in the production of iron ore.

Marble of excellent quality and a variety of colors occurs in large quantities in Talladega and Bibb counties. Limestone is also abundant, and sandstone and other building stones are quarried in various places. Lithograph stone and soapstone also occur, and the state has valuable deposits of bauxite, from which aluminum is made. Porcelain clay, fire and building clays, corundum, slate, graphite, asphalt, phosphate and other valuable rocks are also found in small

but paying quantities, and the Black Belt is underlaid with cement rock.

Forests and Lumber. The Timber Belt, which extends inland 150 m. from the coast, contains an abundance of yellow pine. Valuable forests also occur in other parts of the state. The lumber industry is one of importance, the output of sawed lumber amounting to about $35,000,000 annually. Turpentine and rosin are also produced to the value of more than $5,000,000 each year.

Agriculture. Agriculture is the chief occupation, and nearly 65 per cent of the population engage in it. Both soil and climate are conducive to a great variety of crops, all of which are produced in abundance.

Soil. Proceeding from the north southward, the state may be divided into four soil belts. The first includes the Tennessee Valley and the northern counties. Here the richest soils consist of red clays and dark loams of the river valleys. This region is known as the Cereal Belt. Directly south of the Cereal Belt is the mineral region, whose soils are of varying degrees of fertility. South of this region is the famous Black Belt of the South, which is a part of the Cotton Belt, and forms a narrow strip of black loam extending across the central part of the state. Because of the color of its soil, this region is locally known as the Black Prairie. South of this is the lowland of the Coastal Plain, embracing 13,000 sq. m. and including the Timber Belt in its southern portion.

Products. Cotton is the chief product and is raised most extensively in the Black Belt, but in smaller quantities in each of the soil belts described above. Other crops in the order of value are corn, oats, wheat and hay. Fruits, melons and other vegetables and tobacco flourish in the uplands, and the foothills afford excellent pasturage. Peanuts are quite extensively grown in the southeast, and sugar cane is produced in the south.

Manufactures. The manufacturing interests have grown as rapidly as the development of mineral wealth. The leading manufactures are those of iron and steel. Much of the pig iron produced in Birmingham finds a ready market in England, where it can be sold cheaper than iron produced by the English smelters. Supplying this demand has made Alabama a leading state in the Union in the production of pig iron; and in the manufacture of iron and steel she is fifth. The manufacture of coke ranks next in importance, and the state is third in the Union in this industry. Most of the coke is consumed by the local iron and steel works.

The manufacture of cotton goods has increased rapidly since 1900 and now constitutes one of the important industries. Lumber, turpentine and rosin are produced in the Timber Belt. There are cement works at Demopolis, Leeds, Ragland and Birmingham, and many small factories devoted to supplying local needs are distributed throughout the state. The abundance of coal and water power, together with the liberal policy of the state toward new industries, lend to the manufacturing interests of Alabama a prosperous outlook.

Commerce and Transportation. The chief exports of the state are cotton, iron and steel and their manufactured products. Coal, lumber and agricultural produce follow in the order of importance. The rivers of the state have a combined navigable mileage of over 2000 m., about 1500 m. of which are open to steam navigation. Large boats ascend the Alabama to Montgomery, and the Tombigbee to Columbus, Miss. Steamers also ascend the Chattahoochee to Columbus, Ga. Canalizing the Black Warrior and connecting it with Birmingham will give that city a direct water route to Mobile. The railroad mileage exceeds 6000 m. and is divided among the leading trunk lines that pass through this section of the country. These with their numerous branch lines place all parts of the state within easy reach of railway facilities. Birmingham is the chief railway center, and Mobile is the only seaport. Other important railway centers are Montgomery, Tuscaloosa, Anniston and Dothan.

GOVERNMENT. The state has had five constitutions, the present one having been adopted in 1901. The governor and other state officers are elected for a term of four years and cannot succeed themselves. The Legislature consists of a House and a Senate and meets once in four years. The passage of local or special bills is prohibited. The governor during his term of office and for one year thereafter cannot be elected or appointed to the United States Senate or to any state office. The rights of property are carefully safeguarded, and the earnings of the wife are her separate property. Child labor is restricted, and children under 12 years of age cannot be employed in factories except in special cases. Children and women cannot be employed in mines. All amendments to the Constitution must be approved by a three-fifths vote of each house, then ratified by the people.

The judicial system includes a Supreme Court, Circuit Courts and Chancery and Probate courts. Judges of the state are chosen for a term of six years. Local affairs are administered by counties and municipalities.

EDUCATION. The public-school fund is provided chiefly by state appropriation, special taxation and revenue derived from the land given Alabama by the United States in 1819. The state is making rapid progress in extending and perfecting her public-school system. A county high school is established or provided for in each county, and separate public schools are maintained for white and colored children throughout the state.

The chief higher educational institutions are: the University of Alabama at Tuscaloosa; the Alabama Polytechnic Institute at Auburn, which is also the state agricultural college; the Southern University at Greensboro; Howard College at East Lake; Birmingham College at Birmingham; Judson College at Marion; and Woman's College at Montgomery. The Tuskegee Normal and Industrial Institute at Tuskegee is the largest and best-equipped school in the South for negroes. State normal schools for whites are located at Florence, Jacksonville, Troy, Livingstone, Moundville and Daphne; and for negroes at Montgomery, Normal and Tuskegee.

STATE INSTITUTIONS. A hospital for the insane is located at Tuscaloosa. Schools for the deaf and dumb and the blind, for both white and colored pupils, are at Talladega. A reform school for white boys is located at Birmingham, and the penitentiary is at Wetumpka. The Confederate soldiers' home is at Mountain Creek.

CITIES. Birmingham, with a population exceeding 225,000, is the largest city and chief commercial center. Other cities of importance are Montgomery, the capital; Mobile, Tuscaloosa, Talladega, Anniston, Huntsville, Florence, Gadsden and Dothan.

HISTORY. Alabama was first visited by De Soto about 1541. It was then occupied by tribes of Cherokees, Chickasaw, Creek and Choctaw Indians. The first settlement was made at Mobile in 1702 by the French under Bienville, and was named Fort Louis de la Mobile. Nine years later the city was founded and was the capital of Louisiana for nine years, after which the seat of government was removed to New Orleans. For the first 50 years the inhabitants were subject to frequent conflicts with the Indians.

After the Treaty of Paris, 1763, what is now Alabama was divided, the northern half being joined to the British Province of Illinois and the southern to West Florida. In 1779 Spain seized the territory south of the 31st parallel and held it until 1813, when the United States took possession, under the claim that the territory was included in the Louisiana Purchase. During the War of 1812 settlers suffered from numerous conflicts with the Indians, who were incited to hostility by the British. The most serious of these was the massacre at Ft. Mims in 1813. Following this affair the Indians were crushed by American troops under General Jackson. Some years later they were forced to remove to Indian Territory. The Territory of Alabama was organ-

ized in 1817 and two years later Alabama became a state. The state was one of the first to pass the ordinance of secession in 1861, and Montgomery was the first Confederate capital. Alabama suffered severely during the Civil War, but since that conflict she has more than recovered her former prosperity and is now widely known for her agriculture, mining and manufacturing industries.

GOVERNORS. William Wyatt Bibb, 1819-1820; Thomas Bibb, 1820-1821; Israel Pickens, 1821-1825; John Murphy, 1825-1829; Gabriel Moore, 1829-1831; Samuel B. Moore, 1831; John Gayle, 1831-1835; Clement C. Clay, 1835-1837; Hugh M'Vay, 1837; Arthur P. Bagby, 1837-1841; Benjamin Fitzpatrick, 1841-1845; Joshua L. Martin, 1845-1847; Reuben Chapman, 1847-1849; Henry W. Collier, 1849-1853; John A. Winston, 1853-1857; Andrew B. Moore, 1857-1861; John Gill Shorter, 1861-1863; Thomas H. Watts, 1863-1865; Lewis E. Parsons, 1865; Robert M. Patton, 1865-1867; Wager Swayne, 1867-1868; William H. Smith, 1868-1870; Robert B. Lindsay, 1870-1872; David P. Lewis, 1872-1874; George S. Houston, 1874-1878; Rufus W. Cobb, 1878-1882; Edward A. O'Neal, 1882-1886; Thomas Seay, 1886-1890; Thomas G. Jones, 1890-1894; William C. Oates, 1894-1896; Joseph F. Johnston, 1896-1900; William J. Samford, 1900-1901; William D. Jelks, 1901-1907; B. B. Comer, 1907-1909; Emmet O'Neal, 1909-1914; Charles H. Henderson, 1915-1919; Thos. E. Kilby, 1919——. See Study Guides.

Alabama Claims. The adjustment of the claims of the United States against Great Britain for damages inflicted during the Civil War by the *Alabama* settled a point of international law on which the world's governments up to that time had not been in accord. The *Alabama* was a vessel built at Birkenhead, England, in 1862, for the Confederate States. She left port without clearance papers, and at the Azores received supplies of guns, stores and coal from two British ships. Captain Raphael Semmes then assumed command and on Aug. 24, 1862, named the vessel the *Alabama* and nailed the Confederate flag to the masthead. Before Sept. 16 she had destroyed Federal ships and provisions valued at more than her own cost, which was estimated at $250,000, and for over two years was the terror of Union merchantmen in every sea. In all she captured 65 vessels and destroyed cargoes worth over $4,000,000. Cruisers searched the seas for her until finally her captain took refuge in the port of Cherbourg on the coast of Normandy, June 11, 1864. The United States warship *Kearsarge,* under command of Captain Winslow, arrived a few days later, and on June 19 a fight took place and the *Alabama* was sunk; her captain and officers were picked up by an English yacht. Great Britain's Foreign Enlistment Act of 1819 forbade the equipment of any land or naval forces within British dominions to operate against any friendly nation. Nevertheless a number of other vessels built in Great Britain were allowed to escape and as Confederate cruisers helped the *Alabama* in destroying Union commerce.

Soon after the destruction of the *Alabama,* Secretary of State Seward notified the Government of Great Britain that the United States would consider that damages were due her for injuries done to her commerce by vessels fitted out in British ports, and offered to submit the matter to arbitration. The tribunal was provided for by the Treaty of Washington in May, 1871, and met at Geneva, Switzerland, Dec. 15, the same year. It consisted of representatives of Great Britain and the United States and three members appointed by the King of Italy, the Emperor of Brazil and the President of Switzerland. The decision was rendered on Sept. 14, 1872, and was adverse to Great Britain, which was ordered to pay to the United States the sum of $15,500,000 as damages.

Alabama River, a river of the United States, formed by the junction of the Coosa and Tallapoosa a few miles above Montgomery, Ala. It flows westward, then southwestward in a winding course until it meets the Tombigbee to form the

Mobile about 33 m. north of the city of Mobile. It is about 350 m. long and is navigable its entire length.

Alabama, The. See ALABAMA CLAIMS.

Alabama, University of, at Tuscaloosa (1831). It has fifteen buildings, a site of nearly 300 acres and a library of about 35,000 volumes. The professors and instructors number 80; the students, 2100. It is coeducational. Its medical school is located in Mobile.

Al'abas"ter, a name given rather indiscriminately to two different substances: one a carbonate of lime; the other, a kind of gypsum or sulphate of lime. The former is found in caves in the form of stalactites or stalagmites, and is a translucent stone of yellowish color. It is found in the Mammoth Cave in Kentucky; also in the Cave of Antiparos. The latter kind, with gypsum characteristics, has a fine granular texture, and is usually of a pure white color. Before exposure to the air it is quite soft and can be easily carved into ornaments. These are frequently sold for Florentine marble. Clock frames, vases and statuettes are produced from alabaster of the harder variety. White granular gypsum is found in Italy, Egypt, Asia and the United States. See GYPSUM.

Alad'din, the hero of the narrative of *Aladdin and the Wonderful Lamp* in the *Arabian Nights* tales. He is a poor boy in China who obtains possession of an old lamp and ring having magical properties. By rubbing the lamp he can call to his service a mighty genius, who obeys all his commands. Among other wonderful deeds, the genius builds him in a single night a magnificent palace, after giving him the princess for his bride. Later, in Aladdin's absence, the princess gives the lamp to an African magician who had formerly owned it, and who poses as a peddler, offering "new lamps for old." The magician then takes the entire establishment to Africa, but by his magic ring Aladdin is enabled to follow his enemy, whom he kills, and to recover the lamp. Then the hero brings back to China his bride and home, where they live in all happiness.

Alameda, *Al" a ma' da,* **Cal.,** a city of Alameda Co., 11 m. s. e. of San Francisco, on the Southern Pacific, the South Pacific Coast and other railroads. Ferry lines on the intervening bay bring it within six miles of San Francisco. Among its numerous industrial works are borax plants (the largest in the world), oil refineries, potteries, shipbuilding yards and street-railway power plants. Alameda is a popular summer resort and a place of residence for many San Francisco business men. It is the seat of the College of Notre Dame (Roman Catholic) and has a fine Carnegie library. The executive power of the city is vested in a board of four trustees, the president of which is the chief administrator. The place was incorporated as a city in 1885. Population in 1920, 28,806.

Alamo, *Ah' la mo,* an old Catholic mission used as a fort, located at San Antonio, Tex., and memorable as the scene of a siege and massacre that occurred during the war of Texan independence, March, 1836. The fort was of stone, about an acre in extent and surrounded by a wall three feet thick and ten feet high. Here about 2000 Mexicans under Santa Anna besieged Col. William Barrett Travis with 140 Texans and Americans, and for 11 days the beset troops held out, notwithstanding the fact that, being surprised, they had had little time to gather food or ammunition. Finally, on the morning of March 6, Santa Anna assailed the fort and, aided by large reinforcements and heavy artillery, captured the place, killing all but six of the defenders. These, including Col. David Crockett, were all murdered save a colored man, a woman and a child. The Mexican loss aggregated some 1600 men. After this conflict, the most sanguinary and heroic of the border warfare, "Remember the Alamo" became the Texas battle cry and the fort became known as the "Thermopylæ of Texas."

Al'aric I (about 376-410), a famous chieftain of the Visigoths, who first appears in history in 394 as a leader of

Gothic mercenaries in the Roman army of Theodosius. After the death of Theodosius in 395, Alaric assumed the leadership of the Visigoths, whom he led into Greece, and there they sacked Corinth, Argos, Sparta and all of the Peloponnesus. Arcadius, ruler of the Eastern Empire, sought to buy him off with a commission as "imperial lieutenant" in Illyria and Greece, but when the able Roman general, Stilicho, was murdered, Alaric besieged Rome, and in 410 swept with his forces upon the city, which for five days and nights was given up to plunder. The chieftain now led his host toward the south, but died before he could carry out his plan of conquering Sicily and Africa. Upon his death the Visigoths moved westward into Spain, where they set up a kingdom (412) that lasted 300 years.

Alas'ka, a territory of the United States lying in the northwestern part of North America and bounded on the n. by the Arctic Ocean, on the e. by Canada, on the s. by the Pacific Ocean and on the w. by Bering Sea and Bering Strait. The most westerly of the Aleutian Islands lies near the same meridian as New Zealand, while Cape Prince of Wales, on the west coast of the mainland, lies in line with the Samoan Islands.

Size. Alaska has an area of 586,400 sq. m., which is slightly greater than the combined area of the three largest states of the Union — Texas, California and Montana. It is roughly rectangular in shape but has the long Alaskan Peninsula and the chain of the Aleutian Islands stretching away in a great curve to the southwest, and a long, narrow strip lying along the east coast of Canada. Its greatest length is 1100 m. and its greatest width 800 m.

Population. The permanent population in 1920 was 54,899, of which about 33,000 are Indians, Eskimos, Aleuts, Chinese, Japanese and negroes; there are besides about 7000 miners who spend but a few months of the year in the country. Of the white population 3200 are women. Though Alaska is the largest single possession of the United States its population is less than any except that of the small Island of Guam.

Surface. So much of the interior of Alaska remains unexplored that at present little can be definitely told. The Yukon basin is probably the best-known region. It consists of a great plain of moderate height, which was evidently only recently a part of the sea floor. In the south and southeastern parts are some of the highest mountains of the continent, including Mt. Fairweather, Mt. Cook and Mt. Tillman, all between 14,000 and 16,000 ft. in height, Mount St. Elias, over 18,000 ft., and Mt. McKinley, 20,500 ft. The mountain systems of Alaska belong to the Coast Range rather than to the Rocky Mountains, and they are often spoken of as the Alaskan Alps. They stretch away into the Aleutian Islands, whose separated peaks are too high to be covered by the sea.

Because Alaska lies so far north the snow line is comparatively low, and great glaciers, unsurpassed in size, outside of the polar regions, cover the slope. The largest-known glacier is that which descends from Mount St. Elias, the Malaspina Glacier, said to have an area of 1500 sq. m., and which is larger than the State of Rhode Island. Upon Hubbard Glacier, the three largest glaciers of Switzerland could be placed without covering it, while the front of it is a mighty wall of ice nearly 300 ft. in height. Among the mountains are many active and extinct volcanoes. Mt. Wrangell is one of those most recently active.

Rivers. Alaska has many large rivers which furnish entrance to the interior, although their courses are interrupted by numerous whirlpools and rapids that render navigation difficult. The Yukon, however, which is one of the world's greatest rivers and which has a descent of 1400 ft. in its length of from 1500 to 1600 m., is navigable during the season from June to September, from the mouth to the city of Dawson in Canada. Other great rivers are the Tanana and the Porcupine, tributaries of the Yukon; the Colville at the north; the Noatak

and the Kowak on the west; and the Copper and the Shushitni at the south. These have been little explored except in the search for gold, and are not of great value for navigation.

CLIMATE. The climate is not everywhere the cold, forbidding one that might be expected from the huge glaciers and the northerly latitude. In the southern strip which extends along western Canada, in many of the river valleys and in much of the coastal region the climate is milder than on the corresponding eastern coast of America. On the Pacific coast and even far to the north the warm Pacific current renders the summer day warm, and the clear sunshine of the long Arctic daylight frequently raises the temperature above 95°, although down deep below the really rank vegetation that then springs up lies a layer of ice that never melts. At Sitka solid ice seldom forms, but because of the heavy rainfall and the dense fogs the climate is cold and disagreeable.

MINERALS AND MINING. Mining is the industry which has probably had the most to do with the development of Alaska. Gold is found in great veins in the eastern section and upon many of the islands. In the Yukon district are rich placer mines whose deposit is now supposed to extend almost throughout Alaska. The rush to the Klondike region in 1898-99 led to the belief that this vein might cross the Alaskan boundary, but the richer mines have been found to lie at Anvil Creek and in Nome and Seward Peninsula. In 1919 the output of gold from Alaska was valued at $16,271,800. Among the other mineral products are copper, which in 1919 was about $26,000,000; tin, found near Cape Prince of Wales; lead; coal, found in great quantity but of poor quality; petroleum, gypsum and marble. Many of these resources are comparatively undeveloped owing to the shortness of the season in which the deposits may be worked.

FORESTS AND LUMBER. The forests of Alaska are vast and almost untouched by the hand of man. The glaciers, however, descending the mountains, have uprooted whole forests and carried them away in great moraines. The trees are chiefly of the Pine Family, and spruce, hemlock and red and yellow cedar prevail. The national forests of Alaska comprise about 26,762,000 acres, and the yield of lumber is sufficient for local uses.

AGRICULTURE. The investigations of the United States Department of Agriculture have indicated that a considerable portion of Alaska is available for agricultural purposes. Although the soil is excellent, wheat will probably not be raised because of the short season, but barley, oats, hay and vegetables are successfully raised; live stock has been taken to Alaska and where allowed to run wild has in some sections been able to survive the long winters unsheltered. The grazing areas in the south are large and are so luxuriantly covered with natural grasses that stock raising promises to become a great industry. The department of agriculture has established several experiment stations, and the results of their labors show in the continued annual decrease in the shipment of vegetables and other farm products from the United States. The reindeer has been introduced and is of great benefit to the inhabitants.

FISHERIES AND FUR TRADING. After mining, the great industry of Alaska, and by far the oldest, is fishing. The seal fisheries were opened by the Russians but have reached their highest development since the territory became American. Attempts at regulating the deep-sea fishing have been almost unavailing, and the seal is gradually being exterminated (See FUR SEAL; FISHERIES). Whaling off Alaskan shores was begun about 1840 and had a brief season of prosperity, but has declined in this region as elsewhere (See WHALE). The salmon fisheries are the great and constantly-increasing branch of the industry. The salmon catch has long been valuable, and since the establishment of the first cannery in 1878 the advance in its importance has been rapid; now many canneries are in operation and each year shows a marked increase in the development of the industry, which improved

governmental regulations promise to render permanent. Other important fisheries are those of the cod, halibut and herring.

Aside from the seal, the sea otter, the white caribou and the reindeer are the fur-bearing animals. The threatened extinction of the former has led to the passage of regulations prohibiting its capture for a term of years.

Commerce and Transportation. In the south, Alaska has many excellent harbors which are free from ice throughout the entire year. Farther north harbors are fewer and the season of open navigation much shorter. The great need of Alaska is the development of railroads and other means of communication. There were in 1912 nine railroads whose total mileage was over 500. Among the railroads special mention must be made of the United States Government railroad which when completed will extend from Seward on the coast to Fairbanks on the Tanana branch of the Yukon river. The building of this road insures the development of immense coal fields in the Mantanuska and Nenana sections and will undoubtedly be the key opening to public use the treasures of mineral wealth now inaccessible.

Government. Alaska since 1912 has been a regularly organized territory of the United States. As in all territories, the governor is appointed by the president of the United States and confirmed by the Senate. The legislature is elected by the people of Alaska and possesses powers of local self-government. For this purpose, Alaska is divided into four judicial districts, courts for which are held at Juneau, Nome, Valdez, and Fairbanks. Each district elects two members of the Alaska senate and four members of the lower house. The governors and senators serve four years each, the members of the house serve two years each. The legislature meets in March of the odd numbered years. The session is limited to sixty days, a special session may be called for fifteen days. The territory elects one delegate to congress. Women possess the right of suffrage.

Education. The education of the native population of Alaska is under the direct control of the Bureau of Education. The work is not confined to the native children. The entire native population needs practical education. To supply the same, Alaska is divided into districts, each in charge of a superintendent. The force employed consists of doctors, nurses, and teachers. The natives need to be taught sanitary methods of living in their villages. Cooking, sewing, and the use of simple tools form an important part of the school work. The natives are also taught how to promote a few simple industries such as tending to reindeer herds. The teachers live in the native villages. The most northern school house in the world is on the Arctic shores of Alaska. Dog and reindeer teams are employed by the superintendents in making their trips. There are good schools in the towns.

Cities and Towns. Nome, on the southwest coast of Seward Peninsula, was formerly the largest city; in 1900 during the rush of gold seekers its population was over 12,000, but that has dwindled to 2500, making the town the second in size in the territory. Other towns of importance are Fairbanks, the metropolis, situated in the western part in the valley of the Tanana river, Juneau, the capital, a city of about 2000; Eagle, on the Yukon near the Canadian boundary; Valdez, on Prince William Sound at the south; Sitka, on Baranof Island and connected by cable with Valdez; St. Michael on Norton Sound; and Kodiak on the island of the same name southeast of the Alaskan Peninsula. Anchorage on Cook Inlet, having a good harbor and being one of the coast terminals of the Alaska railroad will be an important town.

History. The first references to Alaska are found upon maps of the 16th century, but definite knowledge of the country was brought to Russia by a Cossack adventurer who visited Serbia in 1711 and learned from the natives of a great continent lying across the straits. Peter the Great, excited by the report,

sent Bering, whose name lives in the strait and the sea, to sail the waters east of Siberia. Though Bering made two trips, discovered many islands of the Aleutian chain and even sighted Mount St. Elias, it is not known that he landed upon the continent. During the century that followed, Russian, French and English explorers made their way to Alaska; most important of these in matter of work accomplished is Captain James Cook, who surveyed much of the coast line and prepared the way for Vancouver, Franklin, Mackenzie and Murray.

The Russian Government developed the fur trade but none of the other resources, and, because it seemed unimportant, the location of the eastern Alaskan boundary was never definitely settled. In 1867 William Seward, secretary of state, negotiated the purchase of Alaska from Russia for $7,200,000, and, though much dissatisfaction was expressed in regard to the purchase, the American flag was raised at Sitka on Oct. 18, 1867. Troops were at once stationed there and extensive fortifications prepared, but after about ten years the troops were withdrawn and affairs left in charge of a naval officer. Since 1884 a civil government has been in control.

The boundary dispute, which was long left unsettled, was brought to a climax at the time of the gold discoveries in the Klondike, and was then settled by a commission composed of three American statesmen, an English representative and two Canadians, who met in London in 1903. The name Alaska was given by Seward and is a corruption of the Aleut word meaning great continent.

Alba'nia, an independent state of the Balkan Peninsula, originally a part of the Turkish Empire. It is bounded on the n. by Montenegro, on the e. by Servia, on the s.e. by Greece and on the w. by the Adriatic Sea. A small portion of its southern boundary borders on the Ionian Sea. It has an area of about 11,000 sq. m. The climate is healthful and the fertile soil yields abundant crops, timber supplies and a variety of fruits. The exports consist mainly of tobacco, olive oil, maize, barley, rye, oats, live stock, wool, hides, timber and salt fish. The Albanians represent the oldest race in southeastern Europe and are thought to be the descendants of the earliest Aryan immigrants. They represent three religions: the Mohammedan, the Greek and the Roman Catholic, the Mohammedan being in the majority. Because of its position, Albania was the source of considerable contention during the Balkan War in 1912-13, and it was created an independent state by the treaty ending that war. In December, 1913, the European powers agreed upon Prince William of Wied as the first ruler. He soon left the throne and the country has since been in a state of disorder.

Al'ba Lon'ga, an ancient town of Latium, famed in Roman legendary history as the home of several generations of kings. According to tradition, it was founded by Ascanius, son of Æneas. The twin sons of Rhea Silvia and the god Mars—Romulus and Remus—were born here. In the reign of Tullus Hostilius, third of the legendary kings of Rome, Alba Longa was destroyed; it was never rebuilt, the inhabitants being removed to Rome. Excavations show that the town in remote times had a history. In 1817 a remarkable necropolis was here unearthed, containing burial urns in the form of round huts. In the time of the empire, Domitian had a villa here.

Albani-Gye, *Al bah' ne-Gye,* **Marie Louise** (1852-), a celebrated prima donna, born in the Province of Quebec She received her early musical training under her father, and when seven made her first public appearance. At 18 she went to Paris, studying under Duprez and Benoist, and, later, at Milan, under Lamperti. In 1870, at Messina, she made her début in Bellini's *La Sonnambula,* appearing as Albani, a name taken from an ancient, almost extinct, Italian family. Having achieved great success throughout Italy, she sang in London in 1872, later winning fame in America, Russia, Germany, Australia and South Africa. Besides being an opera singer, Albani has distinguished herself in oratorio.

One of her most ardent admirers was Queen Victoria, at whose funeral she sang, and she was court singer to the Emperor of Germany. On Oct. 14, 1911, in Royal Albert Hall, London, she gave her farewell concert on retiring into private life. She has published *Forty Years of Song*.

Albany, *Ol' ban y,* a town of West Australia, in the County of Plantagenet, 254 m. s.e. of Perth. The climate is excellent, the heat never excessive, and it is a popular summer resort. The Marine Drive, encircling the hills, overlooks one of the finest harbors of Australia. Forts command the harbor and a pier 1700 ft. long gives protection to steamers. The Great Southern Railway penetrates to this point from the interior of the colony. The town has a garrison. Among the flourishing industries are printing, tanning, brewing and coach building. In 1871 Albany became a municipality.

Albany Conventions. On account of its location in the North, Albany, on the Hudson River, was chosen as a favorite meeting place during the colonial period for various conventions called to discuss important movements and take such action as would best serve the interests of the colonies. None of the three conventions held here between 1690 and 1754 was of special importance. All had to do with pacifying the Indian tribes occupying territory in what is now central New York, and each was temporarily successful.

Convention of 1754. The convention held in 1754 was by far the most important. An assembly of representatives of the seven Northern colonies, Massachusetts, New Hampshire, Connecticut, Rhode Island, New York, Pennsylvania and Maryland, was called together by the British Board of Trade to consult in regard to the threatening French war. It met in June and two plans were proposed: first, a league with the Five Nations, which was carried out; second, a proposal offered by Benjamin Franklin for a political union. In this, a common president of the colonies to be appointed by the British sovereign was proposed, and a great council representing the colonies. The council was to consist of three-year members, two to seven from each colony; and was not to be adjourned or dissolved or kept over six weeks in session against its will. The council could lay taxes, maintain troops, manage Indian affairs and authorize new settlements. This plan was rejected by the British Crown because it gave too much power to the colonies, and by the colonies because it gave too much power to the Crown. The result, however, was the stimulation of the colonies toward union.

Albany, Ga., a city and the county seat of Dougherty Co., about 100 m. s. w. of Macon, on the Flint River at the head of navigation. Transportation facilities are provided by the Atlantic Coast Line, the Central of Georgia, the Georgia Northern, the Seaboard Air Line, the Albany & Northern and other railroads. Among the products of the section in which the city is situated are cotton, vegetables, sugar cane, oats, wheat, Indian corn, hay, fruit and melons. There are valuable timber lands, and the deposits of lime and artesian water constitute other important natural resources. Large quantities of cotton are shipped, and in connection with the cotton industry there are cotton mills, a cotton compress, cottonseed-oil presses and guano factories. Other establishments are brickyards, ice plants and lumber mills. Albany is an attractive winter resort; and here the Georgia Chautauqua holds its meetings. The place was settled in 1836 and incorporated two years later. It is administered under a charter of 1899. Population in 1920, 11,555.

Albany, N. Y., a city, county seat of Albany Co. and capital of the state, 143 m. n. of New York, 200 m. w. of Boston and 297 m. e. of Buffalo, on the west bank of the Hudson River at the head of tidewater, just below the mouth of the Mohawk River, and on the New York Central & Hudson River, the West Shore, the Boston & Albany, the Boston & Maine, the Delaware & Hudson and

other railroads. The city is situated at the intersection of the great thoroughfares of travel and traffic, having direct steamboat communication by day and night lines with New York City and the important cities along the Hudson. The Erie Canal also connects here with the Great Lakes, and the Champlain Canal with Lake Champlain and the St. Lawrence River, which gives Albany great advantages as a receiving and distributing center for the Western and Canadian trade. Electric railways extend to Troy, Cohoes, Saratoga and Lake George on the north, a distance of over 70 m., to Schenectady, Amsterdam, Gloversville and other points on the west, a distance of over 50 m., and to Hudson on the south, a distance of 37 m. Several bridges cross the Hudson to Rensselaer, a suburb of the city.

Albany has a river frontage of four miles and is attractively located on a series of hills rising sharply from the river. The older portions of the city are reminiscent of the colonial days, having some fine specimens of Dutch architecture still standing. The newer parts of the city have many handsome private residences and modern apartment houses.

Parks and Boulevards. The city has a large number of parks, comprising over 306 acres, the most pretentious of which, Washington Park, in the western part of the city, contains the bronze statue of Robert Burns by Calverly, the King Fountain of *Moses Smiting the Rock,* designed by Rhind, and the Soldiers' and Sailors' Memorial, designed by H. A. McNeil, sculptor, which is considered to be one of the handsomest memorials of its kind in the country. Beaver Park is another of the attractive park group. In connection with the park system there are about 100 acres of boulevards under park care. In the beautiful Rural cemetery four miles north of the city are the tombs of President Arthur and Gen. Philip Schuyler.

Public Buildings. Among the public buildings the finest is the state capitol, one of the most imposing in the United States. It is built of white Maine granite and occupies a commanding position in Capitol Square, one of the highest points in the city. The cost of the building was approximately $25,000,000. The grand staircase in the western end of the capitol is said to be the finest staircase in the world. The State Education Building opposite the capitol on Washington Avenue is one of the most attractive buildings of its kind in the United States. It covers an entire city block, and is built of white marble, terra cotta and dark granite. Other buildings include the state arsenal, Harmanus Bleecker Hall, state museum of natural history, state armory, a penitentiary, the old state hall, city hall, Federal Building and the New York State National Bank, erected in 1803. Albany is the seat of both Episcopal and Catholic bishoprics and contains about 76 churches.

Institutions. The educational institutions include the State College for Teachers organized as a Normal School in 1844, chartered by the State Board of Regents as a college in 1890; the Albany Boys' Academy; the Albany Academy for Girls; Christian Brother's Academy; the Academy of the Sacred Heart; St. Agnes School; the Academy of the Holy Name; the Dudley Astronomical Observatory; the State Health Laboratories; the Young Men's Libraries; the State Library; Albany Medical College and the Albany Law School which counts among its graduates Wm. McKinley and Justice David J. Brewer. The hospitals and charitable institutions include the Albany, Homeopathic, and St. Peter's hospitals, the Brady Memorial Hospital, the House of the Good Shepherd, Albany Orphan Asylum, St. Vincent's Orphan Asylum, St. Francis de Sales Orphan Asylum. The State Education Building contains museums, scientific collections and the State Library.

Industries. Albany has manufactories of wide and well-known importance, which include alphabet blocks, checkers and dominoes, axle grease, aniline dyes, architectural iron, baking powder, billiard balls, blankets, brushes, car-

bonic acid gas, cardboard and glazed paper, carriages and wagons, confectionery, clothing, chemicals, car wheels, college caps, gowns and hoods, car-heating apparatus, electric heaters, enameled signs, felt shoes and slippers, furnaces, gas meters, gas ranges, knit goods, lasts, machinery, photographic mounts, papermakers' felts and jackets, paper towels, paste, hay, cotton, rag and paper presses, railway-signaling apparatus, shoes, saws, stationery, shirts, collars, cuffs, stained glass, steam traps and pumps, stoves, stove specialties, tin boxes, tobacco and cigars and underwear. There are also large plants for slaughtering, meat packing, printing and lye packing, and two of the largest plants in the United States for the building and repairing of railroad cars.

History. Albany is one of the oldest of the permanent European settlements made in the United States. The Dutch navigators came up the Hudson, or, as the Indians had named it, the Shattemuc, as early as 1610 and built trading houses to traffic for furs with the various Indian tribes. In 1623 the Dutch West India Company erected a fort and named it Ft. Orange in honor of the Prince of Netherlands. For a time the little village built around the fort was called Beverwyck. The place was surrendered to the English in 1664 and named Albany in honor of the Duke of York and Albany, afterward James II. In 1754 a convention of representatives met here for the purpose of arranging a permanent union, thus making Albany the original cradle of American union and liberty. Albany became the state capital in 1797. Population in 1920, U. S. Census, 113,344.

Al'batross, a family of sea birds closely related to the petrels and containing some of the largest aquatic birds known. The common albatross is generally found in the Southern Hemisphere, occurring in large numbers around the Cape of Good Hope. The albatross has a heavy body, short neck, large bill, hooked at the tip, and nostrils forming small tubes on the upper side of the upper mandible. The body has a length of about four feet and the bird weighs from 15 to 25 lb. The wings are long and narrow. The powers of flight are unusually strong and these birds will follow ships for several days without any apparent rest.

The body is white, the back being streaked crosswise with black and brown bands, and the wings are dark. The food consists of small fish and animal refuse that floats on the sea. Sailors consider the albatross a bird of good omen, as shown in Coleridge's *Rime of the Ancient Mariner.*

At length did cross an albatross;
Through the fog it came;
As if it had been a Christian soul
We hailed it in God's name.

Another species, the black-footed albatross, is common on the Pacific coast of America.

Al'bemarle Sound, an inlet in the coast of North Carolina, about 55 m. in length, 4 to 15 m. in width and with a greatest depth of 18 ft. A long island separates it from the ocean, and it receives the Roanoke, Chowan, Little, Pasquotank and Perquimans rivers. Its shallow water is nearly fresh, is not greatly affected by tides and is of little value for navigation.

Al'bert I (1875-), King of Belgium, son of Count Philippe of Flanders, nephew of Leopold II, whom he succeeded. At the age of 15 Albert entered the military school of Brussels and became a master of military science. In his early years his learning was towards mechanics and engineering; but his regal duties have carried him into other fields, where politics and economics have been studied with painstaking care. He has traveled extensively, visiting America in 1898 for the purpose of studying the railway system here, and later going to Africa in order to investigate conditions in the Congo State. He is in sympathy with the educational progress of the masses and comes into close contact with the laboring population of his kingdom, himself taking part at times in the hardest manual labors. His policy is one of com-

mercial and economic expansion, which is exercised through his general attitude of friendliness to contemporary powers. He succeeded to the throne in 1909, nine years after his marriage with Princess Elizabeth of Bavaria.

In the European war of 1914, Belgium was exposed to an invasion from Germany the records of which form one of the saddest chapters in history. "Belgium is a nation, not a highway," was the indignant reply of Albert to the demand of Germany for an unobstructed march through Belgium to France. In the war itself, no nation made a greater sacrifice than Belgium under the lead of Albert. Her cities were pillaged and burned, her citizens were subjected to nameless indignities and murdered; her art treasures and cathedrals were wantonly destroyed; her territory groaned beneath the crushing weight of military despotism. But this great sacrifice was not wholly in vain. The delay thus occasioned saved Paris, possibly France, and perhaps even the war itself.

Albert Edward Nyanzi, one of the smaller lakes of Central Africa on the boundary between Congo state and Wyanda, a little south of the equator; in area about 800 square miles.

Albert, Francis Charles Augustus (1899-1861), Prince of Saxe-Coburg Gotha, one of the smaller states of the German Empire. Educated at the University of Bonn. Married Queen Victoria of England in 1840, and was generally known as Prince Consort.

Alber'ta, a province of the Dominion of Canada, bounded on the n. by the 60th parallel of north latitude, on the s. by the United States, on the e. by Saskatchewan and on the w. by British Columbia. Its length from north to south is 770 m.; the length of the northern boundary is 220 m. and that of the southern, 175 m. The area is 253,500 sq. m., of which 2360 sq. m. are water. It is the fourth province in area, being exceeded by British Columbia, Quebec and Ontario. It is a little smaller than the State of Texas in the United States and more than twice the size of the United Kingdom. Population in 1919, estimated 600,000.

Surface. The foothills and main range of the Rocky Mountains extend into the southwestern part of the province for a short distance, but with this exception Alberta lies within the Great Central Plain, and its surface is about equally divided between prairie in the south and woodland in the north. The prairie is on the most elevated step of the Central Plain, and where it meets the foothills reaches an altitude of about 4500 ft. Some Rocky Mountains within the border rise to 10,000 and 12,000 ft., and Banff on the Canadian Pacific Railway is surrounded by some of the most sublime scenery in America. Nearly all the land is suitable for cultivation; most of the surface has a layer of clay overlaid by a rich black soil varying in thickness from a few inches to four and five feet.

Lakes and Rivers. There are a number of lakes in the central and northern parts, the most important being Lesser Slave Lake, north of the center; Hay Lake, in the northwest; and Lake Athabaska in the northeast, about one-third of which is in Alberta. The central portion of the province is drained by the Saskatchewan River and its tributaries, of which the Bow is the largest. The northern part is drained by the Athabaska, which rises in the west-central part of the province and flows in a northeasterly direction into Lake Athabaska, and by the Peace, with its tributary, the Wabiskaw. The Hay crosses the extreme northwestern corner. The southern part is drained into the Missouri chiefly by the Milk River.

Climate. The northern boundary is within seven degrees of the Arctic Circle, and the southern is on the 49th parallel of latitude. The summers are characterized by long, sunshiny days and clear skies and the winter by dry frost. In some months severe cold spells occur, but owing to the dryness of the atmosphere the inhabitants easily withstand the cold. The winters in the western part are milder, owing to the influence of the chinook winds (See Chinook). The

average rainfall is from 9 to 13 inches, and most of it occurs during June and July, the months when it is most needed for growing crops. In a section in the southwest dry-farming methods are successfully carried on. With this exception the rainfall is sufficient for the production of excellent crops. Throughout the province the climate is remarkable for its bracing and health-giving properties.

Minerals and Mining. Alberta has over 16,200 sq. m. of coal measures, and coal of all varieties, from anthracite to lignite, is found. There are large mines in the Crow's Nest Valley in the Rocky Mountains and around Lethbridge, Yellow Head Pass and Brazeau Rivers, and smaller mines have been opened in other places to supply local needs. The total output is about 4,000,000 tons a year. There is an abundant supply of natural gas around Medicine Hat and in the northern part of the province, at Pelican Rapids. Petroleum has been found in the southern part of the province and at Ft. McMurray. There are valuable beds of asphalt in the northern part. The tar sands in this region indicate that it is underlaid with petroleum and natural gas. Gold in paying quantities is found in the sands along the rivers, and placer mining is carried on along the Saskatchewan for about 60 m. each side of Edmonton.

Forests and Lumber. In the prairie region trees are found only along the streams, but the central part of the province is a beautiful park region where forests and prairie intermingle, and the northern part contains forests of still greater value. Lumbering is not yet developed, but the province contains a large amount of commercial timber and wood for thousands of tons of pulp.

Agriculture. Practically the entire province is covered with a highly fertile soil, and agriculture is and will continue to be Alberta's greatest industry.

Crops. The entire province is remarkably well suited to raising wheat, oats, rye, barley, potatoes and garden vegetables, but wheat is the chief crop. In the southern half of the province both spring and winter wheat are raised. While the region further north is confined to spring wheat, which can be successfully grown in the Peace River Valley, the average yield of spring wheat is 23 bushels to the acre, and of winter wheat, 25 bushels. Moreover the quality is of the best, and the variety known as Alberta Red maintains the highest price in the markets of the United States and Europe. The soil is free from stones and the most modern farm machinery is employed. On many large farms the traction engine furnishes the motive power for plowing and seeding and for harvesting and threshing the crop. The yield for 1918 was 65,800,000 bushels, but the acreage increases rapidly each year, with a corresponding increase in the number of bushels raised.

Other cereals in order of importance are barley, oats and rye. Flax is also an important crop. Potatoes and vegetables can be raised in all localities, and small fruits, such as strawberries, raspberries and blackberries thrive well. In the southern part of the province along the Bow River is an arid region which is being developed by the Canadian Pacific Railway by irrigation, and here are found the most extensive irrigation works in America (See Irrigation, subhead *Canada*). Dry farming is also successfully practiced in some sections of this locality.

Live Stock. Alberta is an excellent country for live stock, and large numbers of horses and cattle are raised. In the western part of the province horse ranching is very successful, and this region has long been known for its excellent draft and carriage horses. The native grasses afford excellent pasturage for both horses and cattle; and many beeves are shipped every year. Sheep and hogs are raised and their number is on the increase. There is an excellent local market for hogs and their products, and they prove a profitable investment.

Mixed Farming. The country is adapted to mixed farming, which is gradually replacing the all-wheat farming in the older sections of the province. Dairying is gradually increasing, and enough

ALBERTA

butter and cheese are made to supply local demands. While for the first two or three years after he has taken up his land the farmer may suffer some privations, he soon reaches a financial standing that enables him to erect good buildings and have a comfortable home supplied with all the necessities and some of the luxuries of life.

Statistics. The following table shows the leading products of the province for 1918.

CROPS.

	Acres.	Yield in Bushels.
Wheat	2,605,000	65,800,000
Rye	18,000	440,000
Oats	2,124,000	102,199,000
Barley	332,000	9,774,000
Flax	81,000	1,310,000

LIVE STOCK.

Horses	317,000
Cattle	1,090,300
Sheep	179,200
Hogs	149,400
Total	1,735,900

MANUFACTURES. Manufactures have not developed beyond the local stage, owing to the larger returns from investments in land. The chief manufacturing industries are the production of lumber, making brick and such manufacturing and repairing as are necessary to meet the needs of the various lines of railway. With an abundance of fuel, extensive water power and the raw material at hand, the manufacturing industries will doubtless increase in numbers and extent from year to year.

TRANSPORTATION AND COMMUNICATION. The navigable waters have an extent of 4000 m. The most important of these waterways are the Athabaska, the Peace and the Saskatchewan rivers. The Canadian Pacific Railway crosses the southern part of the province and has branch lines extending in various directions and a line from Calgary to Edmonton. The Grand Trunk Pacific crosses the province south of the center, and the Canadian Northern has a line north of the Grand Trunk Pacific and nearly parallel with it. Another line has been completed from Edmonton to Athabaska Landing, and one to the Peace River is under construction. The chief railway centers are Lethbridge, Calgary and Edmonton. Postal facilities are ample and mail reaches all localities regularly. The telegraph is found in all towns, and telephone lines are common in rural communities, so that most farm homes have telephone communication. The telephone lines are under government control. All lines of communication are extended from year to year to meet the needs of rapidly growing communities.

GOVERNMENT. The chief executive of the province is the lieutenant-governor, who is appointed by the governor-general of Canada for a term of five years. The lieutenant-governor is assisted by an advisory council consisting of heads of the various departments of the provincial government. The Legislature consists of an Assembly of 41 members elected by districts. The government is given full power to legislate upon its own affairs, excepting that its acts must not conflict with the constitution and laws of the Dominion. Alberta is represented in Dominion Parliament by four members in the Senate and seven in the House of Commons. The judges of the provincial courts are appointed by the Dominion Parliament for life or during good behavior.

EDUCATION. An excellent system of public schools is maintained. Any district not exceeding five miles in length or breadth and having within that area four residents and 12 children may be organized into a school district, have a schoolhouse built and a teacher supplied. By this provision every community is assured of school privileges. The larger towns and cities have graded schools and good high schools. The University of Alberta is at Edmonton.

CITIES. The chief cities are Edmonton, the capital; Calgary, Banff, Lethbridge, Medicine Hat and Wetaskiwin, each of which is described under its title.

HISTORY. Alberta was formerly a portion of the territory belonging to the

Hudson's Bay Company and purchased by the Dominion Government in 1869. It then became a part of the Northwest Territory. The first immigrants reached the country by the Red River, cart and prairie schooner. The Canadian Pacific reached the province in 1883, and the company at once began to call attention to the vast area of fertile land along the line. Immigration set in from Great Britain, the Eastern Provinces of Canada and the United States and the population increased rapidly. In 1881 it was 18,075; in 1891 it was 22,277; in 1901, 73,022; and in 1919, 600,000. In 1882 the name Alberta was given the territory in honor of Princess Louise Alberta, daughter of Queen Victoria and wife of the Marquis of Lorne, governor-general of Canada. That year the Princess and Marquis visited the territory. In 1905 Alberta became a province of the Dominion of Canada.

Albert Lea, *Le,* **Minn.,** a city and the county seat of Freeborn Co., 95 m. s. of Minneapolis, on the Illinois Central, the Chicago, Rock Island & Pacific, the Iowa Central, the Chicago, Milwaukee & St. Paul, the Minneapolis & St. Louis and other railroads. The city is something of a railway center and market for the surrounding region, which is extensively engaged in dairying. Butter is one of the chief products. In the city are a number of large industrial establishments, including foundries, machine shops, grain elevators and manufactories of carriages, wagons, metal, refrigerators, corsets, woolen goods, brick, tile and flour. Attractively situated, between Albert Lea Lake and Fountain Lake, the place is a popular summer resort. An abundant supply of good water is furnished by numerous artesian wells. Notable features of the city are a handsome county courthouse; a public library; Albert Lea College (Presbyterian), for women, founded in 1885; and Luther Academy (Norwegian Evangelical Lutheran), founded in 1888. The city was named for Lieut. Albert Miller Lea, who surveyed the region in 1836. Population in 1920, U. S. Census, 8,056.

Albert Nyan'za, a lake of British East Africa, one of the headwaters of the Nile, situated in the valley ending near the mouth of the Zambesi River, with the Blue Mountains to the north and west. It is 100 m. long and 20 m. wide, having an area of about 2000 sq. m. At its southern extremity it receives the waters of the Semliki, the outlet of the Albert Edward Nyanza; and in the north end the Victoria Nile, the outlet of the Victoria Nyanza, discharges into the lake, while the Nile proper issues from it.

Al'bia, Iowa, a city and the county seat of Monroe Co., 67 m. s. e. of Des Moines, on the Iowa Central, the Wabash, the Chicago, Burlington & Quincy and other railroads. The city is in the midst of an agricultural region, the chief products of which are grain and live stock. In the vicinity are valuable coal mines, and a large trade in coal is carried on. Population in 1920, 5,067.

Albi'no, the name applied to plants, animals or human beings that are without pigment, or coloring matter. In people the dark coloring matter is absent from skin, hair and eyes. The skin is milky white, the iris of the eye is rose-colored, the pupil is red and the hair is white. Albinism occurs among animals without reference to any distinct class, and it is also common to all races of mankind. It is prevalent among negroes and Indians.

Al'bion, Mich., a city of Calhoun Co., 20 m. w. of Jackson and 39 m. s.w. of Lansing, on the Kalamazoo River and on the Lake Shore & Michigan Southern, the Michigan Central and other railroads. It manufactures carriages, doors, sashes, harness and agricultural implements; and has malleable-iron works and flour mills. Albion College (Methodist Episcopal), a flourishing coeducational institution, is located here. Albion was settled in 1831 and was incorporated in 1885. Population in 1920, 8,354.

Albion, N. Y., county seat of Orleans Co., on the Erie Canal and on the New York Central & Hudson River Railroad, 30 m. w. of Rochester and 52 m. n.e. of Buffalo. The Western House of Refuge for Women, the Swan Library and the

Pullman Memorial Church are prominent features of interest. It has extensive stone quarries. Its manufactures include iron products, steel-stamped goods, cement building blocks, brick and tile. Population in 1920, U. S. Census, 4,683.

Albu'min. See CARBON.

Albuquerque, *Ahl" boo ker' ka,* **N. M.,** a city and the county seat of Bernalillo Co., about 60 m. s.w. of Santa Fe and 325 m. s.w. of Denver (Colo.), on the Rio Grande River and on the Atchison, Topeka & Santa Fe, the Santa Fe & Pacific and other railroads. The city is situated 4950 ft. above sea level, has a fine climate and is famed as a health resort. It is an important railway center and has railways repair shops, sawmills, a sash, door and blind factory, a box factory, flour and woolen mills, and ice factories. Large quantities of live stock, hides and wool are exported. Albuquerque is the seat of the University of New Mexico, founded in 1889, of the Harwood Industrial School (Methodist), of a government Indian training school and of the Menaul Mission School (Presbyterian) for Mexican boys. St. Joseph's Hospital is a noteworthy institution. The old Spanish town of Albuquerque was founded in 1706 and named in honor of Alfonso de Albuquerque, then viceroy of New Spain. It lies about one mile west of the present city. The place was the scene of a minor engagement of the Civil War. The present city dates from 1880, with the completion of the first railroad. There is modern street-car service, fine hotels, a public library, substantial business blocks and beautiful churches. The streets are wide, well paved and shaded with semitropical trees. There are handsome residences surrounded by lawns and gardens. The city was incorporated in 1892. Population in 1920, U. S. Census, 15,157.

Alces'tis, the daughter of Pelias. She had been promised in marriage to him who should take her away in a chariot drawn by lions and boars. King Admetus of Thessaly performed this difficult feat through the aid of Apollo. The young couple were living most happily when Admetus suddenly sickened. Apollo begged the Fates to spare him, provided another would die in his stead. They agreed; but no one would make the sacrifice save his queen, who weakened as he grew stronger. Hercules came to the court just as Alcestis was dying. Lying in wait till Death came for his victim, Hercules fought and vanquished him, returning Alcestis to her joyful husband.

Al'chemy. See CHEMISTRY.

Alcibiades, *Al" si bi' a dez,* (about 450-404 B. C.), an Athenian general. He was of aristocratic birth and a near relative of Pericles. He lost his father at an early age. He had great beauty and wealth and was very brilliant, but early gave signs of obstinacy and lack of self-control. At first friendly to Sparta, Alcibiades induced the Athenians to ally themselves against her after the peace of 421 B. C. He strongly advocated the expedition against Sicily and was appointed one of the commanders, but barely reached Sicily when he was recalled. Escaping to Sparta, he induced the Spartans to send Gylippus to Syracuse and to fortify Decelea in Attica. These were the two chief causes of the fall of Athens. Alcibiades also incited the Ionian cities to rebel against Athens. The Spartans ordered him to be executed, and he fled to Persia. Later he returned, joined the Athenian fleet and gained two naval victories over the Spartans, but was defeated at Andros and lost his command. He then sought refuge in Phrygia, where he was slain.

Al'cohol, Ethyl Alcohol or **Spirits of Wine.** In ordinary usage, the term *alcohol* means the colorless liquid composed of two parts carbon, six parts hydrogen and one part oxygen. The alcohol of commerce is a colorless liquid, with an odor resembling that of ether, and has a burning taste. It is a little more than four-fifths as heavy as water, boils at about 173° F. and freezes at a very low temperature. Alcohol is obtained by distilling fermented substances containing sugar, such as wheat, rye, corn and molasses, several distillations being necessary to procure the alcohol of

commerce, which usually contains from 10 to 15 per cent of water. In Germany, alcohol is now prepared from chicory root. See DISTILLATION; FERMENTATION.

Alcohol is very inflammable and burns with a bluish flame, which gives little light but produces intense heat. Alcohol is extensively used in the arts. It dissolves gums and oils and is, therefore, employed in the manufacture of varnishes, lacquers, dyes, flavoring extracts, preparations of drugs and medicines. It is used in small quantities for heating purposes and for filling thermometers intended for use where very low temperatures are to be registered. It preserves animal tissue and destroys nearly all forms of bacteria. It is, therefore, used in museums for preserving certain classes of specimens. In medicine it is useful as an external stimulant, and it is sometimes recommended by physicians in cases of emergency, but opinions differ as to its value either as a medicine or food. The most careful experiments prove quite clearly that the value of alcohol as an internal stimulant or as food has been, to say the least, greatly overestimated. Alcohol forms a part of all malt and spirituous liquors and constitutes the intoxicating principle in those beverages. Beers, ales and porters contain from two to six per cent; wines, from 8 to 20 per cent; and brandies from 45 to 55 per cent.

DENATURED ALCOHOL. Denatured alcohol that has been treated with some substance which makes it unfit for drinking but leaves it otherwise useful. Wood, spirit and benzine are the substances authorized by the United States Government for denaturing purposes. To these substances the Germans, who lead in the production of denatured alcohol, add bone oil and the oil of lavender or rosemary. Denatured alcohol is extensively used in the arts, and the tax upon it has been removed by the United States Government.

WOOD ALCOHOL (methyl alcohol), is made by distilling hard wood, such as maple, beech and birch, in iron retorts. The product as first obtained contains a number of other substances, such as acetic acid and creosote, and these must be removed by further treatment. Wood alcohol has a disagreeable odor and is not suited for many purposes for which ordinary alcohol is used. It is, however, extensively employed in the manufacture of varnishes and paints. See ABSINTHE; ALE; BEER; BRANDY; CIDER; PULQUE; WHISKEY; WINE; BREWING.

Alcoholism, a diseased state of the body caused by the excessive use of alcoholic stimulants. It generally first appears in the form of a slight indigestion accompanied by trembling of the hands or other parts of the body. In its more acute stages it produces drunkenness, delirium and dipsomania, which is an unquenchable desire for alcohol in any form. When alcoholism becomes chronic it shows its effect upon one or more of the organs; the walls of the heart become thickened, the liver shows a fibrous or fatty degeneration, the stomach does not properly perform its functions, the lungs, eyes and kidneys are subject to disease and the skin becomes swollen and puffy. Lastly the moral senses become blunted. In this stage cure is slow and often impossible. Any of these results is liable to appear and generally several are in evidence.

Alcott, *Ol'kut,* **Amos Bronson** (1799-1888), an American writer, born in Connecticut, the son of a farmer. After peddling in the South, he opened a school in Boston on an original plan, 1828, and when this failed he went to Concord, Mass., and, as a leader of the Transcendentalists (See TRANSCENDENTALISM; BROOK FARM), lectured extensively. In 1842 he visited England. Later in life he became more formal in manner and more orthodox in opinion. Alcott contributed his "Orphic Sayings" to *The Dial,* published fragments of his diary and, among other works, wrote *Concord Days* and *Sonnets and Canzonets.*

Alcott, Louisa May (1832-1888), the most popular American writer of children's stories, was born in Germantown, Pa. She came of a race of distinguished men and women, and her father, Amos Bronson Alcott, was long an interesting

figure in the New England literary group headed by Emerson. In 1828 Mr. Alcott opened a school in Boston, and in 1840 the family removed to Concord, where the authoress spent the greater part of her life. Miss Alcott's education was unique; her teachers were her father and the philosopher Thoreau, and she enjoyed for years the companionship of her father's literary friends. Always fond of writing, she kept a journal from the time she was a little girl and had a story published when she was 16. An additional spur to her literary inclinations was the poverty which the family suffered as a result of the peculiarities of Mr. Alcott, who, from a worldly standpoint, was a failure. It was Miss Alcott's work with her pen that finally brought comfort to the family.

Miss Alcott's first book, *Flower Fables,* was published in 1855, and in 1860 she began writing for the *Atlantic Monthly.* Her experiences as a hospital nurse during the war were written down and published in 1863 as *Hospital Sketches.* Her first novel, *Moods* (1863), showed promise, but she found her true vein when she started to write stories for children. The first of these, *Little Women* (1868), has always been her most popular book. It was followed by others of the same general character, which were welcomed by the young American readers with boundless enthusiasm. *Little Women* is based on the life of Louisa and her three sisters in the Orchard House in Concord, and is thoroughly wholesome and interesting. The Orchard House has been purchased as a permanent memorial of this friend of young readers. While Miss Alcott's literary qualities are not of a high order, her stories have so much life and humor and are so natural and wholesome, that they are still read with undiminished interest. The story of her own interesting life is told in Mrs. Ednah D. Cheney's *Louisa May Alcott: Her Life, Letters and Journals.*

Miss Alcott's best-known stories are *Little Women, Little Men, Old Fashioned Girl, Jo's Boys, Eight Cousins, Rose in Bloom, Under the Lilacs, Jack and Jill* and *Work.*

Alcuin, *Al'kwin,* or **Flaccus Albinus** (about 735-804), an illustrious scholar, born at York, England. He was a pupil of the Cathedral School of York, under the celebrated master Ælbert, whom he succeeded in 766. Fifteen years later he assumed charge of the famous Palace School under the patronage of Charlemagne. He founded a number of schools which were far-reaching in their influence, and was the author of numerous theological writings, besides works on philosophy, mathematics, rhetoric and philology.

Aldeb'aran, a fiery red star of the first magnitude in the constellation Taurus. This beautiful star lies about midway between the Pleiades and Orion at the end of one arm of the small V called the Hyades, in the head of Taurus; for which reason it is often called "the Bull's eye." See STARS; ZODIAC; PLEIADES; ORION; TAURUS.

Al'den, Isabella McDonald (1841-), an American author, better known as Pansy, born in Rochester, N. Y. She served on the editorial staff of several religious papers, including the *Christian Endeavor World,* and wrote some serious books, one of which is a life of Christ. She is best known through the large number of stories she wrote for young people, under her pen name. These stories, though written to impart religious teaching, are interestingly told.

Alden, John (1599-1687), one of the Pilgrim Fathers, who came to America in the *Mayflower* in 1620, and was said to be the first to land on Plymouth Rock in Massachusetts. He was a respected and prominent citizen in the colony, holding positions of public trust. He was treasurer of the colony for three years and at other times its agent, and was for a time a member of the council of war. Longfellow's *The Courtship of Miles Standish* is based upon incidents of his life. After his marriage to Priscilla Mullens, Alden settled on a farm in Duxbury, where he reared a family of four sons and four daughters. He died in

1687, having survived all other signers of the *Mayflower* pact.

Alder, *Awl'der,* a small tree or shrub of the Birch Family. The slender, reddish stems grow thickly along streams and in damp places by roadsides, where they swing their long tassels early in the spring. These tassels, which are drooping catkins of flowers, appear in some species long before the leaves, and in others at the same time as the leaves. The catkins, however, are not the only flowers, for on the same branches may be found smaller, conelike flower heads of decidedly different nature. The catkins are called the male flowers and have only stamens, while the conelike flowers have pistils only, and are called the female flowers. The accompanying cut shows both kinds of flowers and the fruit, a small nut, two of which may be found under each little flower scale.

ALDER

The alder is used commercially for cabinetmaking, and a species common in Europe is considered especially good for piles of bridges, sluices and woodwork which is to be kept under water. The bark is used in making dye, and the charcoal from the branches is used in the manufacture of gunpowder.

Al'derman, Edwin Anderson (1861-), an American educator, born in North Carolina, and a graduate of its state university in 1882. He subsequently received degrees at the University of the South, at Johns Hopkins and at other universities. In North Carolina he served as a city superintendent of schools and as assistant state superintendent, as a professor in the state normal college, and in the state university first as professor and later as president. From 1900 to 1904 he was president of Tulane University, New Orleans, and since then has been president of the University of Virginia. His influence as an educator has been potent throughout the South, and not unrecognized in the National Education Association. As a speaker and writer he is widely known.

Alderney, *Awl' dur ny,* an island in the English Channel, belonging to Great Britain, the most northerly of the Channel Islands. It is widely known for its dairy cattle, the Alderneys, which are extensively bred in England and America. The population is about 2000. See CATTLE; DAIRYING.

Al'drich, Nelson Wilmarth (1841-1915), United States senator, born in Rhode Island. After engaging for a time in business, he entered politics. In 1875-76 he was a member of the State Legislature. He was elected to the National House of Representatives, but resigned in 1881 to enter the Senate as the successor of General Burnside, where he served until 1911, when he declined reelection. He became leader of the conservative wing of the Republican Party in the Senate. Perhaps the most valuable service which he rendered was as chairman of the Congressional Monetary Commission, in which capacity he made an exhaustive study of the monetary systems of the world and reported to Congress a financial system for the United States, based upon this investigation.

Aldrich, Thomas Bailey (1836-1907), American author, born in Portsmouth, N. H. He began his literary career in New York by contributing to newspapers and magazines, and joined the friendly circle of a number of clever writers and artists, among whom were E. C. Stedman, R. H. Stoddard, Bayard Taylor and Walt Whitman. For several years he was engaged in editorial work in New York and Boston, holding the editorship of the *Atlantic Monthly* from 1881 to 1890.

Aldrich was a prolific writer of both prose and verse. As a poet he was best in his short lyrics, which show delicate fancy and a light touch. Among his best-known poems are *The Ballad of Babie*

Bell, Cloth of Gold, Flower and Thorn and *Unguarded Gates*. His prose stories are written with care and have the graceful style characteristic of his poems. In the *Story of a Bad Boy* the author describes his boyhood days in Portsmouth. This book has been translated into German as a specimen of American humor. His best-known novels are *Prudence Palfrey, The Queen of Sheba* and *The Stillwater Tragedy*.

Ale, a malt liquor in which fermentation was stopped before the sugar was decomposed, and which contains a strong, bitter flavor from hops. Fermentation is completed in the barrel, where the sugar is changed to alcohol and carbon dioxide. The percentage of alcohol, and therefore the strength of the ale, depends upon the length of time fermentation is allowed to go on, old ale being stronger than new. Ale has a pale yellowish tint and a bitter taste. It is an intoxicating beverage. See BEER; BREWING.

Aleutian, *A loo' shan,* **Islands,** a group of 150 islands extending about 800 m. west from the Peninsula of Alaska, and, with the Commander Islands, off the coast of Siberia, separating Bering Sea from the Pacific Ocean. The Unimak Island is one of the largest of the archipelago. Grass and wild flowers abound in the fertile soil, and cattle have been raised on large ranches owned by residents from the United States. The caribou are now extinct, and the largest existing native animal is the fox. The fisheries of cod and halibut in the surrounding waters are valuable. The natives, called Aleuts, number about 1800, and eke out a scanty living by fur trapping and fishing. The islands were discovered by Vitus Bering in 1741.

Al"exan'der, the name of eight popes. Alexander I is supposed to have reigned from 109 to 119. Alexander VI (1431-1503) became pope on the death of Innocent VIII. He was a man of remarkable sagacity, courage and executive ability. Alexander VIII, the last of the name, reigned from 1689 to 1691.

Alexander Archipelago, *Ar"kipel'ago,* a group of islands off the west coast of Alaska. They number about 1100, and the largest include Baranof, Kupreanof, Chichagof, Admiralty and Prince of Wales. Sitka is located on Baranof Island.

Alexander I (1777-1825), Emperor of Russia from 1801 to 1825. He began his reign with important reforms, notable among which was the creation, in 1802, of eight ministries, a marked step towards order in governmental procedure. Steps were taken to codify the laws, an imperial bank was instituted, Odessa was made a free port and the laws regarding debt and mortgages were amended. During the Napoleonic wars, Alexander for a time aided Napoleon, but the two emperors became enemies in 1812, following which Napoleon made his disastrous invasion of Russia. Alexander joined the allies in the final campaigns and was prominent in the Congress of Vienna. He was much less liberal in the latter part of his reign, concurring in the reactionary policy of Metternich and becoming the leading spirit in the formation of the Holy Alliance, which received a permanent check in regard to aggressions in the New World, with the promulgation of the Monroe Doctrine in 1823. See HOLY ALLIANCE.

Alexander II (1818-1881), Czar of Russia from 1855 to 1881, succeeding his father Nicholas I. He was carefully educated by his parents and acquired a good knowledge of the chief European languages. He ascended the throne in the midst of the Crimean War, with which he was not in sympathy and which he brought to a close as soon as he honorably could. In 1861 he emancipated 23,000,000 serfs and at the same time reformed the system of land tenure. During the next few years other reforms followed, including the establishment of regular courts of justice and a public school system, the reorganization of the army and navy, relaxation of the censorship of the press and extension of the representation and liberty of his subjects. In 1877-78 he took the field in person in the Russo-Turkish War (See RUSSO-TURKISH WAR). His reforms were not

radical enough to suit the Nihilists, and several attempts were made upon his life, the last of which caused his death by the explosion of a bomb.

Alexander, John White (1856-1915), an American figure and portrait painter, born in Allegheny City, Pa. At Munich and in Italy, where he afterwards studied, he painted many praiseworthy pieces. He was awarded gold medals at the Paris Exposition (1900) and at the World's Fair at St. Louis (1904). Chief among his portraits are those of Walt Whitman (Metropolitan Museum, New York), Rodin (Cincinnati Museum) and Mrs. Clarence Mackay. His ideal figures include *La Femme Rose* (Carnegie Gallery, Pittsburgh), *The Green Bow* (Luxembourg Gallery, Paris), *The Pot of Basil,* based on the poem of Keats (Boston Museum), *Autumn, A Rose* and *The Glass Bowl.*

Alexander Nevski (1220-1263), Russian prince and hero. He fought with bravery against the Mongols and the Danes, and gained a noted victory over the Swedes in 1240. He became Prince of Vladimir in 1246. His memory has been perpetuated in popular songs, and he was canonized as a saint.

Alexander the Great (356-323 B. C.), the son of Philip of Macedon and King of Macedon, was only 20 years old when he succeeded to the throne. His mother cultivated the romantic tendencies of the boy; he early took Achilles as his model, and the *Iliad* was his inseparable companion. At the age of 14 he was fortunate in having Aristotle as his tutor, from whom he acquired a love of philosophy and literature which he gratefully acknowledged in later years. His father was the leading general and statesman of his day and early trained his son in the tactics of war. At the age of 16 Alexander quelled a rising of the hill tribes in Macedonia during his father's absence. Added to these advantages was the education which a prince of quick intelligence would naturally absorb at such a court as that of Philip of Macedon.

After his father's death in 336 B. C. Alexander was acknowledged as captain-general of the Hellenes against the barbarians. The Greek states, ever restless and turbulent, however, rebelled against him while he was on an expedition across the Danube in 335 B. C. He quickly returned and destroyed the city of Thebes, save for the temples and the house of Pindar. This put down the rising in the rest of Greece, and an alliance against the barbarians was again formed with Alexander at the head.

ALEXANDER THE GREAT

In the spring of 334, Alexander crossed the Hellespont with an army of from 30,000 to 40,000 well-trained men. After his victory at Granicus he was able to perform his task as liberator of the Greek cities of Asia Minor. It soon became evident, however, that he was not satisfied merely to free Greek cities and to avenge Greece for her attack by Persia. He organized Asia Minor into provinces which were ruled by Macedonian governors.

He now directed his course southward and mastered the coast line. At Issus in 333 B. C. he fought his second pitched battle, where Darius barely escaped, while the family of the Persian king fell into his hands. Alexander's ambitious plan is revealed after this battle. Darius offered to give up to Alexander all the empire west of the Euphrates, but Alexander claimed the whole. He was delayed before Tyre for seven months, and in his anger at this long defense he scattered the Tyrians, and 300,000 of them were sold as slaves. Egypt made no defense, but rather regarded him as a deliverer from Persian tyranny. At the oracle of Zeus Ammon the priest hailed him as son of the god. It was then that he founded Alexandria at the Canopic mouth of the Nile, a city which was to be the commercial center for the new Mediterranean world.

In 331 B. C. Alexander dared to leave the Mediterranean coast and to strike into the heart of the Persian Empire. Returning through Syria, he crossed Mesopotamia and met Darius with a vast host near the old city of Nineveh on the plains of Arbela. Here he won his third victory against the Persians, while their king fled into Media. Alexander decided to secure the southern provinces before pursuing Darius. By the spring of 330 B. C. Alexander was ready to begin his chase of Darius. Each king covered the ground by the greatest exertions, leaving his followers as he went, until early one morning Alexander came in sight of Darius and his train. The Persian king had become a puppet in the hands of his cousin, Bessus, and the other Persian nobles, so they stabbed him before Alexander could reach them. From 330 to 327 B. C. he maintained a systematic campaign against the eastern provinces, among deserts, winter storms and over lofty mountains.

One more step remained for him to take, and in 327 B. C. he crossed the mountains into India. Here he overran the Valley of the Indus, conquered Porus, the Indian ruler, and failed to reach the Ganges only because his army refused to follow him. On his return he moved to the mouth of the Indus and made a voyage to the Indian Ocean. He led his army a terrible march up the coast, ordered his fleet to follow by sea, and reached Susa early in 324. In 323 he went to Babylon, where he was met by embassies from various states which he had not yet visited. He was planning an expedition to the coast of Arabia to develop trade routes from India and Babylon to Egypt and the Mediterranean, when he was taken ill after a night of feasting and drinking. He died June 13, 323 B. C., when he was only in his 33rd year.

Alexander was the mightiest conqueror that the world had ever seen. His more enduring work was due, however, to his statesmanship. This was shown by the numerous cities he founded and by his wise choice of sites; by his far-reaching plans of organization and administration of his vast conquests; by his broad ideal of welding the civilization of the East with that of Greece; and by the attention he paid to the commercial interests of the empire.

We are told by contemporary historians that he had an athletic frame, was of medium height, with a white and ruddy complexion, that he had a lionlike head and eyes "liquid and melting."

The stories which clustered about the name of Alexander were the delight of the Middle Ages, and they were the subjects of poetry in all European languages.

Alexander, William John (1855-), a Canadian educator, born in Ontario. He distinguished himself for his scholarship while studying in Toronto University, in London University and subsequently in Johns Hopkins University, and after a year of further preparation in Berlin he became professor of English language and literature at Dalhousie College, Halifax. In 1889 he was appointed professor of English in University College, Toronto, where he still serves. He helped found the Society of Canadian Authors and has published numerous books on English literature.

Al"exan'dra, Caroline Marie (1844-), Dowager Queen of England, born at Copenhagen, daughter of King Christian IX of Denmark. She was liberally educated and in 1863 was married to Albert Edward, Prince of Wales, heir to the British throne. The marriage followed close upon the death of the Prince Consort, and Alexandra assumed the social leadership in court circles from which the reigning sovereign had temporarily retired. Conspicuous among her numerous public acts was the opening of the Cambridge School of Art in 1865. When Edward VII succeeded to the throne in 1901, Alexandra was crowned queen. She is noted for her charities and domestic virtues, and is a scholarly musician, holding the degree of doctor of music.

Alexandria, a city and chief seaport of Egypt, situated between the Mediterranean Sea and Lake Mareotis, 129 m. by rail n. w. of Cairo. Greek, or Ancient, Alexandria was founded in 332 B. C. by Alexander the Great. Originally it consisted chiefly of the Island of Pharos, joined by a mole to the mainland. The eastern point of this island was the site of the Great Lighthouse, one of the "Seven Wonders of the World," and said to have been 400 ft. high. Among the other ancient buildings are the royal palaces, the Poseideion, or Temple of the Sea God, the Great Theater used by Cæsar as a fortress, the Temple of Saturn, the Mausolea of the Ptolemies and of Alexander, the Cæsareum near which stood the obelisks known as "Cleopatra's Needles," the Serapheum, one of the finest temples, and the museum with the large library. Alexandria was once the largest Jewish city in the world and was a center for commerce as well as Greek civilization and learning. Its importance declined rapidly with the founding of Cairo and with the discovery of a route to India by way of the Cape of Good Hope in 1498.

In the modern city the Arab, or northern, quarter presents an Oriental appearance with its numerous bazaars along the narrow, winding streets. The European portion contains the Place Mehemet Ali, or the business center of the city, around which are found the Ottoman bank, the exchange, the law courts, the Abbas Hilmi Theater and the English Church. Other features of interest include the municipal palace, the museum, the Zizinia Theater, the mosque of Nebi Daniel, the palace called Ras et-Tin, the Roman Catholic Church, the catacombs, the Arab cemetery, "Pompey's Pillar" and the khedivial yacht club.

Railway and telegraph lines connect it with other Egyptian cities. There are an outer and an inner harbor divided by a mole 1000 yards long, and the docks and quays afford ample accommodations for ships. The exports consist of raw cotton, manufactured cotton goods, timber, coal, machinery, rice and wheat. England takes 50 per cent of the exports and supplies 40 per cent of the imports. It also receives the bulk of the 80,000,000 eggs shipped annually. To Mehemet Ali is due the restored prosperity of Alexandria, which had decreased to a town of about 4000 inhabitants under the Ottoman supremacy. The inhabitants represent almost every nation of the East and the West. Population in 1919, over 400,000.

Alexandria, La., a city and the county seat of Rapides Parish, close to the geographical center of the state, on the Red River and on the Texas & Pacific, the St. Louis, Watkins & Gulf, the Louisiana Railway & Navigation Company, the Louisiana & Arkansas, the Southern Pacific, the Chicago, Rock Island & Pacific and other railroads. The river is navigable to this point throughout the year. Vast tracts of pine forests surround the city, extending in all directions for a distance of 60 or 70 m. All sorts of hard woods grow here in profusion. Along the river bottoms sugar cane, cotton, alfalfa and vegetables are grown. North of the Red River, on the uplands, strawberries, potatoes, Irish and sweet, are certain crops. Important manufactures are cotton and lumber products, sugar, molasses, brick and ice. The water supply is obtained from artesian wells. In

the vicinity of the city is the Louisiana Asylum for the Insane, and, on the opposite side of the river, a national cemetery. Alexandria was settled in 1785 on land granted by Spain to Alexander Fulton, in whose honor it was named. The place was incorporated in 1818 and was chartered in 1882. In the course of the Civil War Alexandria was a point of concentration for two land and naval expeditions against the Confederates, and was almost entirely destroyed by fire. The city is at present administered under a revised charter of 1898. Population in 1920, 17,510.

Alexandria, Va., a city and port of entry of Alexandria Co., about 6 m. below Washington, on the Potomac River and on the Pennsylvania, the Southern, the Chesapeake & Ohio, the Atlantic Coast Line and other railroads. The river, here nearly a mile wide, renders the city's harbor accessible to large steamers; and an extensive trade is carried on. The city is a jobbing center for the district surrounding it and has machine shops, planing mills, several shoe factories, glassworks, fertilizer plants, chemical works and manufacturies of brick, silk thread, leather, brooms, aprons, tiling, structural iron, flour and carbonated beverages.

Alexandria has several noteworthy institutions for secondary education, among them the Washington High School and Mt. Vernon, Potomac and St. Mary's academies. The Theological Seminary and High School of the Diocese of Virginia (Protestant Episcopal) is about two and one-half miles west of the city. Settled in 1695, the place was first called Belleville. It is a quaint old city, with shady streets and numerous buildings belonging to the 18th century. In old Christ Church, George Washington and, later, Robert E. Lee regularly attended services. Here in 1755 General Braddock planned his expedition against Ft. Duquesne, and here also in the same year took place, in a house still standing, the meeting of the governors of Virginia, Maryland, Pennsylvania, New York and Massachusetts, at which was planned concerted action against the French in America. In 1814, the town, threatened by a British fleet, paid $100,000 for immunity from attack. The city was first incorporated in 1749 and is administered under a revised charter of 1895. Population in 1920, U. S. Census, 18,060.

Alexandrian Library, a library founded in Alexandria by Ptolemy Soter, King of Egypt, about 300 B. C. It was enlarged by his son Ptolemy Philadelphus and by succeeding rulers until it became the most famous library of ancient times. At its most flourishing period it is said to have numbered 700,000 volumes, many of which had been obtained from Athens and Rome. When Alexandria was invaded by the Romans under Julius Cæsar, most of the books were burned, and the remainder were destroyed by the Christians in 391 A. D.

Alexandrian School. See LITERATURE, subhead *Greek Literature.*

Alfal'fa, or **Lucern,** one of the oldest-known forage crops and now grown extensively in many countries. Its name comes from an Arabic word meaning best fodder, and it is the richest forage plant. One of its claims to high rank is its adaptability to a variety of soils and a variety of climatic conditions. In California alfalfa grows below the sea level; in Colorado, at an altitude of 8500 ft. In Mexico and in Canada it grows equally well, and only the Eastern States have seemed unfit for its cultivation. There the excessive moisture, poor drainage and acid soil have not provided the proper soil conditions for its growth.

DESCRIPTION. Alfalfa resembles clover but stands more erect; the leaves are smoother and of a delicate green shade, but have the same three leaflets, though they are narrower and more sharply pointed. The flowers are sprays of nodding purple blosssoms that sometimes cluster in a loose head and are followed by twisted pods. Its roots are long, sometimes extending to a depth of 20 or 30 ft. into the ground and thus loosening and improving the subsoil; these roots, too, store up at least 40 per cent of the nitrogen of the plant, and, as they decay,

the nitrogen is left in the soil for other crops. Thus alfalfa not only provides excellent fodder, but leaves the soil richer than it found it. It is an extremely hardy plant and long-lived. In the East it has been known to be productive for over 200 years, but its average life is from 15 to 35 years.

Soil. Although alfalfa thrives on a large variety of soils, there are certain conditions necessary to its growth, and the lack of knowledge of these conditions has led to numerous failures in its production in the United States. It requires a deep, fertile, acidless soil, well drained, containing sufficient lime and thoroughly inoculated with nitrogen-fixing germs which will take the nitrogen from the air and convert it into an available form for use. The soil must be deep, since without it the long roots cannot attain their best growth and thus compete successfully with hardy, short-rooted weeds. Fertile soil is necessary in order to provide the rich food which the hay later returns to the farmer; therefore, though the alfalfa adds nitrates to the soil, it does not provide phosphates and potash, which, if not naturally found, must be added in fertilizers. The drainage and the presence of lime prevent the formation of acid, which would effectually stop the growth of the bacteria and hence of the alfalfa.

In the Central States scientific investigation resulted in proof that the success or failure of alfalfa depended upon the presence or absence of the proper bacteria in the soil. A ton of soil from an old alfalfa field was used to inoculate an acre of soil which then produced a fine crop of alfalfa; later from this acre-field much of the soil of the Central States was inoculated, and wherever this has been done, no failures in the alfalfa crop have followed. Wherever sweet clover, an allied plant, grows wild, no inoculation is necessary, and, as this plant is a rank grower in fields of the Central States, much use may thus be made of it.

Cultivation. The seed bed should be prepared with great care if a profitable return is expected. The land should be plowed deep and the under part disked or rolled; the upper part should be left soft and mellow. The plow, the disk harrow and finally the peg harrow may all be used satisfactorily.

Spring seeding, except in the North, is regarded as unprofitable, as alfalfa grows slowly and is easily outdistanced by the more rapidly developing weeds. The United States Department of Agriculture recommends that in the latitude of Maryland and Virginia seeding should take place the middle of August; for every 100 m. north it should be done a week earlier, and south, a week later. Where the seed bed is well prepared, the plants will then have a good start before cold weather. It is also suggested that a crop of early potatoes on the field makes use of the field, renders no additional cultivation necessary and is out of the way in time for the seeding.

Alfalfa should be cut several times during the season, each time just as the crowns of buds are starting the growth of the next crop. The hay should be cured with as little damage as possible to the leaves, as they are especially rich in food.

Uses. Alfalfa is of especial use to the dairy farmer since it increases and enriches the milk. The manure from the stables is one of the best fertilizers for the alfalfa field and thus the dairy and the alfalfa field react upon each other. Alfalfa is fed to the cattle fresh or as hay, ensilage or alfalfa meal. For hogs it is said to be the cheapest and most fattening of foods for both summer and winter use. It is possible that the uses to which alfalfa meal may be put may be widely increased.

Enemies. The chief enemies of alfalfa are the weeds, and of these crab grass is probably the most annoying. A well-prepared soil, in which the alfalfa can thrive, and summer or late sowing of the seed are the best preventives against weeds. Two fungus diseases attack alfalfa, one destroying the leaf and the other injuring the root. The alfalfa leaf-weevil has also made its appearance in the Western States and is becoming a

pest. Several pamphlets issued by the United States Department of Agriculture, which may be had upon application, discuss the control of these and give helpful suggestions for raising the crop.

History. Alfalfa, one of the oldest-known forage crops, is strangely enough one of the last to reach the United States. It is naturally an Oriental plant and is known to have been brought to Greece from Persia about 590 B. C. when Persian emissaries were sent out to precede the army and plant a forage crop for the herds which accompanied the hosts. Gradually as its value became known, the crop was planted in Italy, France and Spain and from there was taken to Mexico. Curiously it entered the United States from the West, reaching California at the time of the gold discoveries. Alfalfa is variously known as French clover, purple medic, Chilean clover and Spanish trefoil.

Alfieri, *Ahl fya' ree,* **Vittorio** (1749-1803), an Italian dramatist, born in Piedmont. His stormy life was the result of a proud and passionate nature, but in his works there is a suggestion of Greek purity, simplicity and finish, and as the great tragic poet of Italy he founded a new school which had many followers. His best tragedy is *Saul;* among the others are *Antigone, Cleopatra, Maria Stuarda* and *Mirra.* He also wrote an *Autobiography.*

Alfon'so, the name of a number of kings of Spain and of Portugal. The earliest sovereign to bear the name was Alfonso I. He was born in 1110 and at the age of 29 conquered the Moors, taking Lisbon eight years later. He died in 1185. A noted ruler of this name was Alfonso X of Leon and Castile, born in 1221. He was a famous philosopher, poet and astronomer, and achieved many military successes, among them the storming of Seville in 1248. He was pretender to the imperial throne of Germany, but was circumvented by Rudolph of Hapsburg.

Alfonso XIII (1886-), King of Spain. His father, Alfonso XII, died in 1885, and Alfonso was recognized at birth as King of Spain, with his mother, Maria Christina of Austria, as regent. Alfonso was crowned in May, 1902. For a while he remained under the influence of the clerical and reactionary leaders, but he soon developed a rather disconcerting independence of thought and action. In 1906 he married Ena of Battenberg, a granddaughter of Queen Victoria. Alfonso XIII has exercised a more liberal policy than his predecessors. Under his direction liberty of worship has been established, and the number of religious orders has been reduced.

Al'ford, Henry (1810-1871), an English writer and Biblical critic, born in London. He prepared an edition of the Greek New Testament, published in 1852. In 1857 he became Dean of Canterbury. As an artist he was successful in painting, carving and music. His writings embrace *Chapters on the Poets of Ancient Greece, Homilies on the Acts of the Apostles, New Testament for English Readers, A Plea for the Queen's English* and *A School of the Heart and Other Poems.*

Al'fred the Great (849-901), King of Wessex from 871 to 901 and one of the greatest men who have ruled the English people. He was the youngest son of Æthelwulf, King of the West Saxons, and succeeded to the throne on the death of his brother Æthelred. During the first few years of his reign Alfred was occupied in subduing the Danes, finally defeating them at Ethandun, in 878. King Guthrum, their leader, was baptized and peace was confirmed by the Treaty of Wedmore. After 15 years of comparative peace the Danes again invaded England, and it required four years of warfare to conquer them. Alfred, by successfully coping with this people, made his kingdom the Saxon rallying point and made possible the subsequent supremacy of his descendants. He was more than a great warrior, however, for he codified the laws and labored zealously for the education of his people, inviting to his court such learned men as Asser and John Scotus Erigena. He

translated works which he thought would be useful to the people, enlarging or omitting wherever it seemed advisable, and probably initiated the *Anglo-Saxon Chronicle* (See ANGLO-SAXON CHRONICLE). He also instituted valuable miltary reforms, increased the navy and earned the title of "protector of the poor" by his care for the administration of justice.

Alga, *Al' ga,* a name given to a group of plants, mostly seaweed, whose parts are not organized for different kinds of work, and which differ from fungi by containing a coloring matter enabling them to assimilate their food. This coloring matter is generally the same chlorophyll which is contained in leaves, but it may be green, blue-green, brown or red in color (See CHLOROPHYLL). The green algæ are generally found in fresh water, on moist soil or on damp walls. The other algæ are found in salt water. They vary in size from microscopic organisms to gigantic plants with spreading stems. Some of the algæ are edible; others produce dyes, as "Irish moss" used in calico printing, and agar-agar, a substance used to solidify jellies. Scientists classify the algæ according to their methods of reproduction.

Al'gebra, that branch of mathematics which deals with the relations of numbers expressed with symbols other than figures, generally letters. Its value consists chiefly in the fact that its operations express principles which apply to all numbers, while those of arithmetic apply only to the definite numbers used in that mathematical transaction. The letters commonly used in algebraic operations are last of the alphabet, generally *x, y* and *z;* when the first, *a, b, c,* etc., are used they are understood to represent quantities whose values are known. All arithmetical rules may be stated in algebraic formulæ as equations, and were often first developed in that form.

Algebra as a science seems to have been developed simultaneously in Egypt and India, and consisted in the use of words rather than of letters. The first problems were stated in the form of this old Egyptian equation, "The seventh, the whole; it is 19," which would now be represented by the equation $\frac{x}{7} + x = 19$. Algebra became especially well-developed in Italy through the bringing into that country by a merchant traveler, of several Arabian treatises on algebra, which the Arabs had copied from Hindu manuscripts. The Italians occupied themselves chiefly with the solution of equations, but the results of their efforts were not widely known until the middle of the 16th century, when Germany, England and particularly France became centers of mathematical study. It is probable that the latter country is responsible for the permanent use of letters as symbols and for the adoption of the signs $=$, $+$, $-$ and $\surd$, which were first used in algebra. The further development of this branch of mathematics has been chiefly along lines which connect it with trigonometry, arithmetic and calculus.

Since the computations of algebra differ from those of arithmetic only in the universality of their application, algebra is also spoken of as universal, literal, or symbolized arithmetic. Its first name was *ars magna;* its present title is an abbreviated form of the title of the old Arabian manuscript, which carried the science into Italy. See Study Guides.

Algeciras, *Al" je se' ras,* a seaport of Spain, in the Province of Cadiz, 6 m. w. of Gibraltar. The harbor is good and well fortified, and the town contains fine churches and monasteries. Among the Romans it was known as the Pontus Novus. The Moors seized it from Africa in 711 and called it Algeciras, or the Green Island; they occupied it until 1344, when Alfonso XI of Castile recaptured it for Spain. It was the seat of the international conference for the regulation of Moroccan affairs which assembled in January, 1906 (See MOROCCO). Population, 13,300.

Al'ger, Horatio (1834-1899), American author, born at Revere, Mass. He completed both the university and theological courses at Harvard, and after serving two years as pastor of the Uni-

tarian Church at Brewster, Mass., removed, in 1866, to New York, where he began his literary work. The bulk of his writings consists of juvenile stories, the character of which may be judged by some of the titles: *Tattered Tom, Paul Preston's Charge* and *Ragged Dick.*

Alger, Russell Alexander (1836-1907), an American soldier and public man of New England ancestry, born in Ohio. After securing a common school education by working part of the year on the farm to meet expenses, he studied law and was admitted to the bar in 1859. He removed to Michigan in 1860 and entered the Union army in 1861 as captain in the Second Michigan Cavalry. Before the end of the war he had become colonel and brevet major-general for meritorious service. After the war Alger settled permanently in Detroit and became wealthy in the lumber business. In 1884 he was elected governor of the state on the Republican ticket; was the unsuccessful candidate for the presidential nomination in 1888; was chosen commander-in-chief of the Grand Army of the Republic in 1889; and was appointed secretary of war by President McKinley in 1897. He was appointed United States senator in 1902 and was elected for the full term in 1903.

Alge'ria, a French dependency of northern Africa, bounded upon the n. by the Mediterranean, on the e. by Tunis, on the s. by the Sahara, on the w. by Morocco. It stretches for 650 m. along the coast, but its shores are so rocky and indented by so few bays that pirates alone attempted to land here until the French improved the harbors and set a series of lights along the coast. Physically Algeria is divided into three parts. The first is the fertile coastal region, where agriculture is the chief pursuit and where orchards and vineyards abound; south of this lies the mountainous region formed by the Atlas Mountains, and still farther south the land slopes to the Sahara, in which the accurate boundaries of Algeria are lost.

Politically Algeria is also made up of three divisions: Constantine in the east, Algiers in the center and Oran in the west. The government is almost wholly in the hands of the French, who at first established military rule and later organized communes and arrondissements similar to those departments in France. Algeria elects three senators and six deputies to the French Legislature, but the Mohammedans, who are considered subjects and not citizens, are not allowed to vote.

Agriculture employs more than two-thirds of the population, and over 7,500,000 acres are devoted to raising cereals. Cotton, olives, tobacco and grapes are other products of importance. The mountains are rich in minerals; iron, lead, zinc, copper, antimony and mercury are mined, while beds of lignite and phosphate and oil wells also yield rich returns. The stone quarries, of which there are over 300, produce onyx and valuable red and white marble.

The chief cities are located along the coast and are Algiers, the capital, Oran, Philippeville and Bona. Constantine, an inland city, is also important. The population is a mixture of Europeans, Orientals and Africans. The Europeans, including the Jews, are in the majority, while the Moors, formerly supposed to be the dominant race, have never been numerous.

Algeria was once known as Numidia and was among the Roman possessions in Africa. After the fall of Rome it belonged successively to the Vandals, Saracens, Moors and Turks. In the 17th century Algeria became independent, but the practices of piracy and of Christian slavery were stopped by intervention of the United States and Great Britain. In 1830 France began the conquest of the country but did not accomplish it until 1848, when the leading native chief was made prisoner. Since then numerous outbreaks have occurred and the maintenance of order has cost more than the revenue returned to France. However, since the time of Roman rule Algeria has not known such prosperity as it now enjoys. Population, 5,231,850.

Algerine War. See BARBARY STATES, WARS WITH.

Algiers, *Al jeerz',* a city and seaport of North Africa, capital of the French colony Algeria, situated on the Bay of Algiers. The houses are built of stone and whitewashed, and as they rise in terraces from the sea, climbing the slopes of the Sahel, they present a picturesque and dazzling appearance. Because of the forests on the hillside the Arabs compare Algiers to a diamond set in an emerald frame. The modern French town is built along the seashore; the old town in the rear has an Oriental appearance with its narrow, crooked streets and flat-topped, substantial houses. Among public buildings of note are the government offices, the palaces, the Grand Mosque, the New Mosque, the Church of the Holy Trinity, the Roman Catholic Cathedral of St. Philippe, a college, a museum and the villas and luxurious hotels of the suburbs. The two harbors are artificial, and Algiers now surpasses Gibraltar in point of importance as the chief coaling station on the Mediterranean. Among the Moorish industries are embroidering in gold and silver thread, the manufacture of gold and silver ornaments and of kid slippers of various kinds and colors. Population in 1919, about 175,000.

Al'gol, a variable star of the constellation Perseus. This star is usually of the second magnitude, but its brilliancy is subject to periods of diminishing, lasting 4½ hours, followed by periods of 20 minutes' duration, when it is of the fourth magnitude. At this time it gives only one-sixth as much light as it does when brightest. After 3½ hours the star is again of the second magnitude. It is evident that the variableness is caused by a satellite which revolves around Algol, regularly cutting off from us a portion of its light. See STARS; DOUBLE AND MULTIPLE STARS.

Algonquian, *Al gon' ki an,* the most widely distributed group of North American Indians. Their territory originally included all of Canada lying between the Rocky Mountains and the Atlantic south of Hudson Bay and, in the United States, that section east of the Mississippi and north of Virginia and Tennessee, with the exception of a small part east of the Great Lakes that belonged to the Iroquois. The Algonquians were the most fearless as well as the most powerful race. Although they gave some attention to tilling the soil and raising corn and vegetables, they were fierce and warlike and spent more time in hunting and in warfare. Against the colonists the Algonquians were especially bitter in their hatred, and the ever-widening boundaries of the setttlements were marked with blood wherever they encroached upon Algonquian territory. In the French and Indian War the Algonquians sided with the French and were their most powerful allies.

The Algonquians of Canada have not been greatly disturbed and are found in much of their original territory. In the United States they are chiefly upon reservations. Throughout America there are at present about 100,000 Algonquians belonging to the Ojibwa, or Chippewa, Mohican, Ottawa, Creek, Micmac, Blackfoot and other tribes.

Algonquin, *Al gon'kin,* National Park, a national forest and park reserve of Canada, located in Ontario, 200 m. n. of Toronto and 175 m. w. of Ottawa. It is a magnificent tract of 1,800,000 acres of forest, lake and rivers, and lies from 1500 to 2000 ft. above sea level. The Ottawa division of the Grand Trunk Railway enters the park and carries passengers almost to the heart of the virgin forest. Here wild game, protected by law, may be found in constantly increasing numbers, while the lakes and streams abound with trout. The fresh, pure air and beautiful scenery render this park a favorite spot for campers. The Magnetawan River rises in this park.

Alham'bra, The, an ancient fortified palace citadel of the Moorish kings of Granada. It rises from a large plateau which overlooks the city of Granada, and is surrounded by a luxuriant wood—the haunt of numerous nightingales and the

scene of sparkling fountains and cascades. Moorish poets have happily referred to it as "a pearl set in emeralds," because of the brilliant coloring of its buildings, constructed of red sun-dried tapia, or bricks. The inside was once a bewildering network of halls and passageways, with immense rooms exquisitely decorated with pillars, arches, filigree work and fretted ceilings. The Court of the Lions, the Hall of the Two Sisters and the Hall of the Abencerrages are especially beautiful. The terrace on which the citadel stands is 675 by 2500 ft., and a wall over a mile in circuit surrounds it, containing 13 square towers. The palace was built between 1248 and 1354, has been subjected to frequent acts of vandalism, and has suffered from defacing earthquakes and fires, but it has been partly rebuilt, and enough remains to give evidence of its former splendor and magnificence. For further description, consult Washington Irving's *The Alhambra.*

Alias, *A'li as,* a legal term used to denote the different names assumed by a person for the purpose of concealing his own name. Stage names, nicknames or names assumed by writers are not included. The term can be properly applied only to persons who have assumed different names for improper purposes. The term is also applied to a writ that is issued after another that was issued for the same purpose.

Alien, *Ale'yen,* any person not legally within the jurisdiction of a country as one of its citizens. By the laws of the United States the children of male citizens, whether born within the country or abroad are held to be citizens, but all other foreign-born individuals are aliens until made citizens by naturalization. The rights of aliens to hold personal property and carry on trade are the same as those of citizens. In time of war, however, aliens belonging to the country of the enemy cannot make contracts with citizens nor resort to the courts except as accorded such privileges by special treaties. In the United States if an alien dies without leaving a will, and without any known heirs, his estate immediately vests in the State according to its property rights, such examination of property being made by the proper officer before a jury. See NATURALIZATION.

Alien and Sedition Laws, a series of statutes enacted during the administration of John Adams, the object of which was the restraint of those most violently opposed to the party in power, and of the sympathizers with France. The Alien Act, passed June 25, 1798, was to remain in force two years. It gave the President power to compel aliens judged dangerous to leave the country, and fixed certain penalties for those who defied the act. The Sedition Act, passed July 14, 1798, was to be in force until March 3, 1801. It imposed penalties for conspiring against the government and its measures, for interfering with the operations of the government, and for printing scandalous matter about the government, President or Congress. The Alien Enemies Act, passed July 6, 1798, provided for the treatment of aliens with whose government the United States might be at war; and the Naturalization Act, June 18, 1798, made a residence of 14 years a qualification for obtaining citizenship. The freedom of the press and of speech were guaranteed by the Constitution, and the suspension of these rights was in violation of that guarantee and a gross political blunder. The people naturally felt that the Alien and Sedition Laws were contrary to the spirit of free government. The administration's best friends condemned these laws and they were repealed.

Al"imen'tary Canal, a system of tubes through which the food passes in its progress through the body and which comprises the chief organs of digestion. Its length in an adult is about 30 ft. It includes the mouth, the pharynx, or throat; the esophagus, or gullet; the stomach; and the large and the small intestine, with their divisions. Every part is lined with membrane and provided with muscles, whose contractions force the food along; and each is supplied with its peculiar secretion for aiding in the

digestive process. See DIGESTION; PHARYNX; INTESTINES; STOMACH.

Aliz'arin. See DYEING.

Al'kali, a name first applied to the ashes of plants, especially seaweeds, but now given to substances which dissolve in water, turn red vegetable dyes blue and neutralize the properties of acids. The term is used in chemistry to refer to the compounds of potassium, rubidium, cæsium, lithium and sodium, which are called the alkaline metals. Ammonium, though not an element, is often classed with these, since it forms similar compounds. Caustic potash, caustic soda and borax, a salt of sodium, are of great use commercially in the arts and in the manufacture of soaps, glass, baking powder and dyes (See POTASH; SODA; SOAP).

The so-called alkali soils occur in regions where there is insufficient rainfall. All soils contain salts of potassium and sodium, but in these particular regions certain atmospheric conditions cause these salts to form a gray powder on or near the surface. There are two varieties of this powder, called the black and the white. Alkalies in large quantities are extremely harmful to the soil, rendering it difficult to till, as well as finally destroying its vegetation. After irrigation was introduced in the West, the alkali deserts increased in area, owing to poorly regulated drainage, but that difficulty is being gradually overcome. The largest alkali deserts now known are those of western North America, extending from Canada south through Mexico, and those of Egypt, Arabia, Asia Minor, China and Australia. See SOIL.

Al'kaloid. See CARBON.

Al'kanet. See DYEING.

Al"lahabad', the "City of God," an ancient city of India, the capital of the Northwest Provinces of British India. It is situated at the confluence of the two holy rivers, the Ganges and the Jumna, and this has made it the scene of numerous pilgrimages, the center of superstitious reverence and a commercial center as well. Aside from the great mosque, or Jumna Musjid, there are no buildings of note; the majority are squalid and miserable and occupy a mean position in the narrow streets. Surrounding the town is a fertile agricultural region, and a large trade mainly in cotton, sugar and indigo is carried on. A religious fair is held annually, at which time the place is so overcrowded with the needy that the natives call the city Fakirabad, or the "city of beggars." It was founded by Akbar in 1575. The English gained possession of it in 1801. The Sepoy Mutiny of 1857 worked great ravages and left a large part of the city in ruins. The population is over 172,000.

Al'lan, Alexander MacDonald (1844-), a Canadian pomologist, born near Stratford, Ontario. He devoted himself to the study of horticulture and pomology and contributed largely to the press on these subjects. As fruit commissioner, he has represented Canada at exhibitions in London, Liverpool, Glasgow, Edinburgh, Paris, Wolverhampton and Cork, thus advertising and disposing of Canadian fruit in European markets. Meanwhile he has been instrumental in promoting syndicates for the exclusive handling of Canadian fruits in British markets. Allan is considered the fruit king of Canada, and is one of the highest authorities on fruit culture.

Allan, Hugh Andrew (1857-), a Canadian capitalist, born in Montreal and educated in Edinburgh and at Rugby, England. Entering the office of Hugh and Andrew Allan as a junior clerk, he was made a partner in the concern in 1881 and had charge of its Boston branch from 1887 to 1892. He is president of the Allan Steamship Company, which position he has filled for years.

Allan, Maud, a Canadian dancer, born in Toronto. When four years old she removed to San Francisco, where her father became a naturalized American. The following year she began studying the piano, but, after having subsequently spent five years of preparation in Berlin, she abandoned the idea of becoming a professional player, to become a dancer instead. After fresh study, she made her first private appearance as a

dancer in Vienna, in 1902, and her first public performance occurred at the Theater Molière, Brussels. Later she aroused great enthusiasm at Berlin, Buda Pesth, Hamburg and Paris, and in London as Salome, in 1908, she danced at court. A later appearance in New York was most successful. Miss Allan has published the story of her life.

Allenby, Sir Edmund Henry. (1861-). A prominent British general in the World War of 1914. Gen. Allenby saw service in Zululand and in South Africa. At the Battle of Mons (1914) he commanded a cavalry division. He took a prominent part in the First Battle of the Marne and in all the major operations on the west front to June, 1917, when he was transferred to Egypt. He was in command of the Allied forces in Palestine, taking Jerusalem in December, 1917.

In September, 1918, he began the final campaign in Palestine, moving north from a line extending from the Jordan to the Mediterranean Sea.

In three weeks the Turkish forces were completely routed, over 70,000 being captured, the city of Damascus was taken October 1, 1918. The success of this campaign occasioned the utter collapse of Turkey October 31 of that year. In 1919 Gen. Allenby commanded the British forces in Egypt.

Al'leghe"ny Mountains, a name sometimes applied to the entire Appalachian system, but properly belonging to those ranges crossing Pennsylvania, Maryland and Virginia, except the Kittatinny and South Mountains in Pennsylvania and the Blue Ridge in Virginia. The Alleghenies are low mountains, being from 2000 to 3000 ft. in height, with an occasional peak of about 3500 ft. The ranges are parallel to the Atlantic coast, and the mountains are generally covered with forests to their summits. They contain valuable deposits of coal, iron and limestone.

Allegheny River, a river of the United States rising in Potter County, Pa., and flowing in an irregular southwesterly course until it joins the Monongahela to form the Ohio. Its length is 325 m., and it is navigable for 200 m. above Pittsburgh.

Al'legory. See FICTION, subhead *The Allegory.*

Al'len, Ethan (1737-1789), an American soldier and patriot, born at Litchfield, Conn. In 1763 he settled near Bennington, Vt., on territory then known as "New Hampshire Grants." Both New York and New Hampshire claimed this tract of land, and the dispute reached issue in a decision of the King unfavorable to New Hampshire. In 1770 Allen was chosen to plead the cause at Albany, but the courts decided against him. To protect their interests the settlers then organized a company called the "Green Mountain Boys," with Allen as leader. They drove their adversaries out of the disputed region, and the governor of New York offered a reward of $750 for the capture of Allen.

Allen was one of the first heroes of the Revolution, taking Ticonderoga soon after the Battle of Lexington. He surprised the fort on May 10 and ordered its surrender "In the name of the great Jehovah and the Continental Congress!" In the same year he accompanied an expedition to Montreal, Canada, and was captured by the British and sent to England. Later he was released and, returning to America, was appointed a lieutenant-colonel of Vermont militia. He was sent to Congress to effect the admission of his state into the Confederation. After the Revolution he lived in retirement, and wrote a book on natural religion, under the title, *Reason the Only Oracle of Man.*

Allen, James Lane (1849-), an American novelist, born near Lexington, Ky. He graduated at Transylvania University and afterwards taught in Kentucky University and in Bethany College, W. Va. Since 1886 he has been devoting his entire time to literature, residing in New York City. His works reveal knowledge of human nature and many of them are of fine finish and artistic treatment. *The Choir Invisible,* first published as *John Gray,* and *The Ken-*

tucky Cardinal are his best-known novels. Other novels and novelettes are *The Reign of Law, Sister Dolorosa, The Mettle of the Pasture, With Flute and Violin, Two Gentlemen of Kentucky, A Summer in Arcady* and *The Doctor's Christmas Eve.*

Allentown, Pa., a city and county seat of Lehigh Co., 57 m. n. of Philadelphia and 90 m. w. of New York City, on the Lehigh River and on the Central of New Jersey, the Lehigh Valley, the Philadelphia & Reading, the Perkiomen and other railroads. The surrounding country is well adapted to agriculture, and limestone, slate, cement rock, zinc and iron ore are found in the vicinity. Allentown is an important manufacturing center. It is situated on rising ground sloping toward the river and commands extensive views of the beautiful Lehigh and Saucon valleys. The city is the center of a number of trolley systems embracing Slatington, Reading, Easton, Bethlehem and South Bethlehem and extending to Philadelphia.

Parks and Boulevards. Allentown has an area of about seven square miles and contains many miles of paved and shaded streets with handsome residences. Center Square contains a soldiers' and sailors' monument, and Dorney Park possesses great natural beauty. The Allentown Fair, one of the greatest county fairs in the United States, is attended by over 200,000 people annually.

Public Buildings. Among the noteworthy public buildings are a courthouse, Federal Building, Livingston Clubhouse, Elks' Home and Young Men's Hall. There are about 40 churches, most of the edifices being of beautiful architecture.

Institutions. The educational institutions include Muhlenberg College, a Lutheran institution founded in 1867 which grew out of the Allentown Seminary, Allentown College for women under the direction of the Reformed Church, a military institute, a preparatory school, a number of parochial schools, a high school, two commercial and several music and select schools. Other institutions include the Homeopathic State Hospital for the Insane, Allentown Hospital, Phœbe Deaconess Home and Good Shepherd Home for Children.

Industries. Allentown is known as the second largest silk center in Pennsylvania in the production of American silks. The city is also one of the largest furniture producers in the United States and has large manufactories of shoes, cigars, brick, fire brick, barbed wire, linen thread, hosiery, men's clothing, knit goods, jute goods, hardware, wire nails, planing-mill products, and auto trucks and auto fire engines. The extensive rolling mills, wire mills, furnaces, cement mills, forge and iron foundries and slaughtering and meat-packing industries contribute largely to the prosperity of the city.

History. The first settlement was made about 1752 by William Allen, chief justice of the Province of Pennsylvania, father-in-law of Governor John Penn, from whom he derived his grants of land. The place was named Allentown in honor of its founder. In 1812 by a division of Northampton County it became the county seat of Lehigh County. A city charter was granted in 1867. Population in 1920, 73,502.

Alli'ance, Ohio, a city of Stark Co., 56 m. s. e. of Cleveland, on the Mahoning River, at the junction of the Lake Erie, Alliance & Mahoning and the Pittsburgh, Ft. Wayne & Chicago and other railroads. It is situated in a rich agricultural region and has an extensive trade in dairy products. Alliance has a large steel plant, rolling mills, white-lead and boiler works and manufactories of heavy machinery, boilers, traveling cranes, gun carriages, drop forgings, steam hammers, terra-cotta ware, cash registers and asbestos products. It also has large railroad shops. Mt. Union College (Methodist), founded in 1846, is located here. The town was first settled in 1838 and was known as Freedom. In 1854 it was incorporated as a city under its present name. Population in 1920, 21,603.

Al'libone, Samuel Austin (1816-1889), an American author, born at Philadelphia, Pa. During the early part of his career he was engaged in mercantile pursuits, but early forsook this field for that of literary endeavor. He was for many years secretary of the American Sunday School Union and is the author of several compilations, among them a *Critical Dictionary of English and American Authors, Poetical Quotations from Chaucer to Tennyson, Prose Quotations from Socrates to Macaulay.* Other works are *Indexes to Edward Everett's Orations and Speeches,* and *Explanatory Questions on the Gospel and the Acts.*

Al'liga"tor, a reptile of the Crocodile Family, represented along the shores of the southern United States by the Mississippi alligator. Alligators differ from crocodiles in having only slightly webbed feet, a shorter, more blunt snout, and a difference in arrangement of teeth; in habits they are much like the other members of this same family. They are nocturnal animals, spending the day sleeping in the hot sun upon some moist beach or marshy river bank, from which they glide quickly into the water at the approach of mankind. At night they hunt for fishes, their chief prey, but do not object to a meal composed of the smaller land animals which come to the shore to drink. The adults feed about once a week.

Alligators reproduce by means of eggs. Both the eggs and the flesh are used as food; the teeth yield a good quality of ivory and the hide is valued in making purses, traveling bags, etc. Because of these products the alligator is rapidly being exterminated from the United States. There is, however, an alligator farm at Miami, Fla., where these animals are raised for their skins. The farm contains about 6000 alligators of all sizes. They are kept in pens according to size, and each pen contains a pool of water and a patch of dry land, where the alligators sleep during the day. The only other species of alligator known is a member of the same genus found in China. See CROCODILE.

Alligator Pear, or **Avocado,** *Av" o ka' do,* a tree, or the fruit of a tree, of the Laurel Family, growing in subtropical countries and cultivated in California and the Gulf States. The tree is evergreen, about 25 ft. in height, and branches somewhat like the common pear. The leaves are shiny, with fibrous veins, and have a tendency to fold along the midrib. The flowers, which grow in thick clusters, surrounded at the base by leafy scales, are spreading and rather pretty. The fruit is pear-shaped, with salvelike flesh and delicious flavor; it is used in salads in localities in which it grows but is not shipped in any quantities.

Al'lison, William Boyd (1829-1908), an American statesman, born in Ohio. He was educated at Allegheny College, Pa., and Western Reserve College, Ohio, and practiced law in Ohio until his removal to Iowa in 1857. At the beginning of the Civil War he became a member of the governor's staff and aided in organizing the Iowa volunteers. He served in the House of Representatives from 1863 to 1871, and in the Senate from 1873 until his death, making a total of 44 years, the longest congressional term or service up to that time. His ability, integrity and experience made him a most valuable public servant and gave him great influence in Congress as a Republican leader. He served on many important committees and commissions, assisted in the framing of the Bland-Allison Act of 1878, and was several times seriously considered as a candidate for the presidency.

Allit"era'tion. See POETRY, subhead *Tone Quality.*

Allop'athy, a name applied by Hahnemann to the ordinary systems of medical treatment as opposed to his system which he called homeopathy. All physicians not following Hahnemann's method are spoken of as allopaths, or "regular" practitioners. See HOMEOPATHY.

Allot'ropy, the property which some

elements possess of existing in more than one form without difference in fundamental chemical characteristics. Carbon has three allotropic forms—the diamond, graphite and the amorphous form of which charcoal and the ordinary lampblack are examples. The change from one form to another is sometimes caused by the application of heat, which changes a diamond to black amorphous carbon like lampblack, and sometimes by the passage of an electric current, which transforms oxygen to ozone. See OXYGEN, subhead *Ozone.*

Alloy', a term given to a mixture of two or more metals when melted and fused together. Metals usually mix together in any proportion when melted, but some of them unite in definite proportions. Some do not mix. The name is applied to all mixtures of metals, excepting those which contain mercury; these are called amalgams. The United States coins are all alloys. Many distinctive names are given to different alloys; namely, bronze, brass, pewter and type metals. There are a number of alloys of steel with other metals, each of which has its own peculiar characteristics. See IRON AND STEEL.

All-Saints' Day, a festival of the ancient Christian Church. It was introduced because it was found impossible to observe a separate day for every saint, and was regularly instituted in 835 by Gregory IV. The first of November was the day appointed for its celebration. In England, where it was introduced in 870, All-Saints' Day is generally observed.

All-Souls' Day, a holy day of the Roman Catholic Church, falling on the second of November. It has for its object the alleviation of the sufferings of those in purgatory. The custom of interceding for departed souls is of great antiquity, but the festival All-Souls' Day was first regularly instituted by St. Odilo of Cluny, in 998.

Allspice, or **Pimen'to,** a spice tree of the Myrtle Family. About five species are natives of tropical America and are cultivated in all tropical countries. The name was given because the fruit when nearly ripe is supposed to have the flavor of all the spices, clove, cinnamon, nutmeg, pepper, etc. The allspice is a low tree with smooth leaves, which are covered with gummy spots. The flowers are tubular, regular in form and have many stamens. A wild shrub, known in southeastern United States as Carolina allspice, is a member of the Calycanthus Family, and is so named from its fragrant blossoms. Another, known as wild allspice or fever bush, is a member of the Laurel Family, and is an aromatic shrub, whose leaves are dotted the same as those of the true allspice.

All'ston, Washington (1779-1843), an American painter, born in South Carolina. After graduating from Harvard, he traveled extensively in Europe, and studied in London, Paris and Rome. He is unsurpassed by any other American painter in the portrayal of sacred history. He has been called the "American Titian," and his work displays imaginative power and beauty of coloring. His chief productions include *The Dead Man Revived, Uriel in the Sun, The Prophet Jeremiah* and *Belshazzar's Feast.*

Allu'vium. See SOIL.

All'ward, Walter Seymour (1875-), a Canadian sculptor, born in Toronto. After a five years' apprenticeship to an architect, he began doing architectural figure work, and a few months later, successful in a competition, executed *Peace,* a crowning figure in Queen's Park, Toronto, which established his position. Later he sculptured many busts, including those of Tennyson and Sir Wilfrid Laurier, most of which were intended for the Provincial Museum, Toronto, and in competition with artists of the United States and Canada, was awarded the execution of a statue of General Simcoe, first governor of Upper Canada. Besides the Nicholas Flood Davin Monument and a statue of Sir Oliver Mowat, Allward executed the South African Monument, one of the finest pieces of work in British America. More recently he chiseled a memorial to the veterans of the War of 1812 and a statue of first Prime Minister Macdon-

ald of Toronto. He also made the designs for a memorial to Baldwin and Lafontaine and for the Alexander Graham Bell Memorial.

Al'manac, a book or pamphlet containing a calendar and information concerning the seasons and heavenly bodies. In former years it was greatly prized for weather and other predictions and for the same reason was often mischievous. The modern almanac contains a vast amount of exceedingly important information concerning the time of rising and setting of sun, moon and stars, eclipses and return of comets; especially valuable to navigators is the nautical almanac published by the United States Bureau of Navigation. See CALENDAR.

Almandine, a kind of precious stone, of which there are two varieties. One, red in color and transparent, is a kind of garnet, and is found chiefly in Alabanda, Caria. The other, a variety of spinel ruby, is of a violet tint. Both are considered fine gems for setting.

Al'ma-Tad'ema, Sir Laurence, or **Laurens** (1836-1912), an eminent artist, born in Dronryp, Holland. He studied at the Academy of Antwerp and in 1870 removed to England. He received innumerable honors from learned bodies and institutions of art. Illustrations from Frankish and Egyptian history and of scenes in Greek and Roman life chiefly occupied his attention. Some of his important canvases are *Dedication to Bacchus, Entrance to a Roman Theatre* and *Way to the Temple.*

Al'mond, a name given to a class of trees and shrubs of the Rose Family. The tree of this group is much like the peach in form, flower and fruit, but is generally larger, growing to a height of from 20 to 30 ft. and bearing beautiful white flowers, which appear before the leaves. The flowers are much like those of the pear or plum, and present a pleasing appearance in the early spring when the trees are filled with blossoms. The fruit is a stone fruit with a wrinkled covering. The pit, or stone, is the familiar nut called the almond, which is known everywhere. In southern Europe and in some parts of California the trees are cultivated for the sake of the nuts, which are exported in large quantities. Wild almonds have a bitter fruit and the nut seems to partake of the same flavor; under cultivation this bitter flavor has been replaced by a sweeter one, and the product is called the sweet almond. Almond wood is hard and of a dark red color. It is used by cabinetmakers for ornamental work. The oil of almonds is used in medicine.

The dwarf, or flowering, almond is more familiar in the United States. It is a low shrub, bearing many white or rose-colored flowers which, like those of the tree, appear before the leaves. These flowers, which are fragrant and very double, so cover the shrub that it appears to be a bank of flowers rather than a bush. Like the almond tree, the flowering almond is a native of Asia. It has been cultivated here as an ornamental shrub. The fruit has a brittle covering which breaks away from the stone at the first frost.

Al'oe, a genus of tropical plants of the Lily Family, useful for their fiber and for a medicine prepared from their leaves. The leaves are large and sword-like and clustered thickly near the base of the stem; their edges are somewhat spiny. The flowers grow in a pyramidal cluster, extending high above the leaves. The fiber is obtained from the leaves and stem and is used in making cord. The medicine, which is merely the thickened juice of the leaves, is generally spoken of as aloes. It is a powerful cathartic, but its action is somewhat uncertain, sometimes causing one ailment while healing another.

Aloewood, the wood of an Asiatic tree of the Mezereum Family. The trees are large and spreading and though quite ornamental are known chiefly because of a resinous substance which they contain. This resin perfumes the wood and makes it popular for cabinetwork. A fragrant incense was formerly made from the resin and burned in sacrificial rites. The wood is hard and of such fine grain that it was once used as setting for precious

stones. Wood aloes is probably the lign-aloes mentioned in Balaam's parable in the Old Testament (*Num. xxiv, 6*). It is also called lignum aloes and eagle-wood.

Alpac'a, a South American animal of the Camel Family, long herded by the Indians for its wool. It is a little taller than the sheep, has a longer neck and more slender body. Its wool, for the shearing of which the Indian annually brings his herd from the mountainous valleys to the less turbulent watercourses, is black, gray or yellow and grows to a length of nearly eight inches; if not sheared it becomes over two feet long. The fiber of the wool is strong, elastic and silky. The wool was first exported from Peru and Chile in 1836 and has become very valuable for the manufacture of a soft, warm cloth for clothing, shawls, etc. The alpaca is very similar to the llama and by some is thought to be only a variety of this long-used, South American beast of burden.

Alpe'na, Mich., a city and county seat of Alpena Co., 110 m. n. of Bay City, on Thunder Bay, an arm of Lake Huron, and on the Detroit & Mackinac and other railroads. The city is situated in a region containing numerous lakes and is a popular health resort. Thunder Bay divides the city into two parts. There is an excellent harbor which has been improved by the Federal Government, and steamboat lines connect the city with Detroit and other ports. The industrial establishments include wood-pulp mills, tanneries, sawmills, foundries and machine shops, excelsior works, flour mills, veneer works, cement works, several paper mills, woolen mills and sash and blind factories. There are also large hemlock-extract works and stave and heading factories. Excellent farm land adjoins the city and valuable stone quarries are found in the vicinity. The fishing industry adds to the city's business interests, and lumber is also largely exported.

Alpena has a fine park system, a public library, a number of banks and about 17 churches. The first settlement was made in 1835. The town was incorporated in 1871 and is governed under a revised charter of 1897. Population in 1920, 11,101.

Al'phabet, a series of characters used to represent the single sounds of a language. They usually have a fixed order and they are represented by various modes (Sec CUNEIFORM INSCRIPTIONS; HIEROGLYPHICS). Modern European languages, with the exception of the Russian, are derived from the Greek, and that in turn from the Phœnician. Various theories have been advanced as to the source of the Phœnician alphabet, and for a long time scholars attempted to identify the Phœnician letters with Egyptian hieroglyphics. More recent investigations have established a close relation between it and the cuneiform characters in use by the Babylonians. While neither origin has been proved, nothing has so far been advanced to show that either might be impossible. Further, a system of inscription in use on the Island of Crete has been discovered, and many have thought that the alphabet now in use was brought over directly from there. The Phœnicians are thought to have selected and grouped certain characters, from the numerous signs that accumulated, giving them a commercial value and then transmitting them to the Greeks. All this, however, is largely theory, without the basis required by scientific accuracy.

Originally the Greek alphabet had 16 letters; the Latin gradually adopted the Greek in its entirety and added until there were 21 in all. The English alphabet possesses 26 characters. It is not wholly satisfactory, for their usage overlaps in some instances and is defective in others. For instance, the letter *c* is unnecessary, its two functions being fulfilled either by the letter *s* or *k*. Others, like *g, f, s,* have two or more sounds. The letter *a* is used for eight different sounds. The other vowels are also variously used.

Alps, a mountain system of southern Europe. It covers an area of from 80,000 to 90,000 sq. m. and extends into France, Germany, Italy and Austria, in-

IN THE SWISS ALPS

PALU GLACIER

It has a movement of from 18 to 24 inches a day.

A DANGEROUS EXPEDITION

The members of this exploring party are fastened together by a rope for safety; they encounter many deep and forbidding crevasses.

The Interior in 1895

The Interior After the Eruption of 1906

CRATER OF VESUVIUS

cluding also the greater part of Switzerland. The total length of the range is 600 m. and its width varies from 75 to 150 m. The Jura Mountains join it on the west and the Apennines on the south. The Dinaric Alps, bordering Bosnia and Dalmatia, form a connecting link with the Balkan Mountains. The Alps proper are divided into the western, central and eastern groups. Among minor divisions are the Maritime, Cottian, Graian, Bernese, Pennine, Lepontine, Rhætian and Tyrolese Alps. The highest summit is Mont Blanc, 15,781 ft. Other peaks towering in the rugged and snowy grandeur thousands of feet above snow level are Mont Pelvoux, Les Erins, the Jungfrau, Finsteraarhorn, Schreckorn, Matterhorn and Monte Rosa. The highest part of the system is the west-central Alps and the region around Mont Blanc.

The mountain range is not continuous, and there are a great number of passes, of which several have been used since the dawn of civilization. The conquering Romans, bent on subduing the world beyond the Alps, eagerly seized upon those in use by the native inhabitants, in order that their progress might be easier. The principal ones are the Brenner, Simplon, St. Gotthard, La Corniche, Col-di-Tenda, San Bernardina and Stelvio passes. Among the important railways crossing the range are the Brenner, from Munich and Innsbruck to Verona and Venice, the Mont Cenis, between France and Italy, the Simplon, from the upper Rhone Valley to Lago Maggiore, and the St. Gotthard, between Lake Lucerne and Lago Maggiore. There are several tunnels, principally the Mont Cenis and the St. Gotthard. The rainfall is ample and this gives rise to glaciers on the mountain heights covering an area of 1600 sq. m. The largest Swiss glacier is the Aletsch, in the Bernese Alps. Others are the Unteraar, the Mer de Glace and the Rhone Glacier. The heavy snowfall causes many destructive avalanches.

Geologically, there are two divisions of the Alps. The central section is composed of crystalline rocks and the outer of sedimentary rocks. The surface reveals the effect of intense erosion; the folding and faulting of the strata are generally northeast and southwest. The climate of the Alpine winter is steadily severe; the summers are uniformly temperate and travelers find the atmosphere invigorating and bracing. The Alps lie within the influence of the cyclonic disturbances of northern Europe. One of the most characteristic winds is the hot, dry wind known as the *föhn,* whose chief useful function is to clear the ground of snow in the springtime, sometimes at the rate of two feet per day.

Indefatigable tourists and hunters have routed the wild animals from even their most secluded lairs, and the native fauna has become scarce within recent years. The principal animals are the chamois, ibex, brown bear, wolf, wild cat, fox, weasel, badger, ermine and otter. Butterflies are common, though on the heights their color pales and their wing power weakens. There are a great number of game and other birds, insects and beetles, but few reptiles. The plant life is unique in that it extends in part up to the line of eternal snow. The trees of lower altitudes are sycamore, beech, ash, oak, chestnut, walnut and maple. The olive, lemon and vine abound on the lower southern slopes. On the high elevations are the fir, the creeping pine and the larch. The Alpine flowers are famous for their beauty, the edelweiss being celebrated the world over. Others are the violets, roses, gentians, edelrue and Alpine bells. Mosses and lichens crown summits where no other vegetable life is found.

Alsace-Lorraine. A province of France extending like a blunt arrowhead into Southwestern Germany. The Rhine River from Switzerland north to near Carlesruhe, Germany, forms the eastern boundary of Alsace, proper. While a line extending from Luxemburg to the same point on the Rhine is the northern boundary of Lorraine, proper. At the conclusion of the Franco-German War of 1870-1 these two sections were ceded to Germany and as Alsace-Lorraine constituted a Reichland of the Empire. The

two sections, not greatly different in area, aggregate 5603 sq. m. of territory. Alsace, proper, the southern wing of the arrowhead, is divided into Upper and Lower Alsace referring to their locations along the Rhine; the Vosges mountains form the western and northern boundary line of the old Duchy of Alsace located in the upper basin of the Rhine. Lorraine on the north was a part of the ancient kingdom of Lothair which fact is indicated in its name.

The climate of the province is mild, the soil is in places fertile. Fruit growing and vine culture is important, especially in Alsace. Among the crops grown are wheat, barley, rye, potatoes, sugar beets, hay, hops and tobacco. The textile industry is prominent, woolens, yarns, and silks are manufactured. The iron deposits are very extensive. In the days of the empire, Germany drew from Alsace-Lorraine three-fourths of all the iron used in her iron manufacturing. Coal is also mined in quantities.

The history of Alsace-Lorraine is part of the confused history of France and Germany since the days of Charlemagne. When his huge kingdom was divided by the treaty of Verdun (843), Lothairs kingdom formed a buffer state between the French on the west, and the Germans on the east and in the course of centuries was ground to fragments between them. Alsace and Lorraine passed back and forth now to France and then for centuries were Germanic states, small units in the confused mass of states forming the ill defined Empire of Rome. From the tenth century to the seventeenth they were distinctly German in ethnology, then they passed under the control of France and became French in language and national traits. In 1871 they passed as spoils of war to Germany and remained German territory until 1919 when they reverted to France. Estimated population about 2,000,000.

Altai, *Ahl ti'*, **Mountains,** a name applied to a succession of highlands and mountain ranges of Asia, but more particularly given to those mountains forming the boundary between Siberia and Mongolia. They cannot be said to form a range or system since they consist of diverging ridges, isolated peaks and plateaus. They are rich in minerals, and their name means mountain of gold. Much mining is done in this region. The Altai Mountains are supposed to be geologically the oldest mountains of Asia, and are worn into rounded summits with grass- or forest-covered slopes. The highest peak, Mt. Bielukha, is thought to be 14,800 ft. high.

Alt'geld, John Peter (1847-1902), an American lawyer and political leader, born in Germany. He came to America in 1849 and settled in Ohio, where he attended the public schools. In 1864 he enlisted in the Union army and saw active service. He was made a judge of the Superior Court of Cook County, Ill., in 1886, and six years later was elected governor of the state, serving the regular term of office. He gained notoriety by his criticism of President Cleveland's interference with Federal troops at the time of the great railway strike; and by his pardon of some anarchists.

Al'titude, the elevation of a heavenly body measured in degrees on a great circle of the celestial sphere passing through the zenith and nadir. The zenith being the point in the heavens directly overhead and the nadir being the point in the heavens directly underfoot through the center of the earth, the great circle of the heavens passing through these points will be at right angles to the horizon at any point in it. The distance of a star above the horizon measured on such a circle passing through the star is its altitude. The distance on this circle down from the zenith is the *zenith distance.* See CELESTIAL SPHERE.

Alton, *Ol'ton,* **Ill.,** a city of Madison Co., on the Mississippi River, 10 m. above the mouth of the Missouri River and 25 m. n. of St. Louis, and on the Chicago & Alton, the Cleveland, Cincinnati, Chicago & St. Louis, the Chicago, Peoria and St. Louis, the Chicago, Burlington & Quincy and other railroads. Alton is an important commercial center containing flour mills, a lead smelter and

oil refinery, and has manufactories of iron, glassware and agricultural and mining tools. Among the most important buildings are the Hayne's Memorial Public Library, St. Joseph's Hospital, Home for Aged Women and the Ursuline Convent. At Upper Alton, one and one-half miles northeast of Alton, are the Western Military Academy (founded in 1879 as Wyman Institute) and Shurtleff College (Baptist), organized in 1827. The first settlement on the site of Alton was made by French traders in 1807. The town was laid out in 1817 and four years later was incorporated. It was chartered as a city in 1837. In 1827 it was made the seat of a state penitentiary, which afterwards was removed to Joliet. Alton contains a monument erected to E. P. Lovejoy, one time editor of a Presbyterian periodical called the *Observer,* in recognition of his support of the abolitionist cause. Population in 1920, 24,682.

Altoona, Pa., a city of Blair Co., 132 m. n. w. of Harrisburg, 118 m. e. of Pittsburgh and 237 m. n. w. of Philadelphia, at the eastern base of the Allegheny Mountains in the upper part of Logan Valley, and on the Pennsylvania Railroad. The city is situated about 1182 ft. above sea level and commands extensive views of some of the most picturesque scenery in the state. The railroad at this point begins to ascend a grade of 90 ft. to the mile, and in five miles is carried over the famous Horseshoe Curve. Altoona is one of the leading railroad cities in the United States and is situated in a bituminous coal region. It is also the business center of a considerable agricultural territory. There is an excellent electric system throughout the city. The streets are well paved, shaded and lighted. Lakemont Park is the largest pleasure resort near the city.

INSTITUTIONS. In 1907 the Pennsylvania Railroad, cooperating with the school authorities, established here a railway high school with science laboratories, machinery and forging departments, carpenter shops and drawing rooms in which expert instruction is given in all kinds of railway work. There is also a city high school, and a library, several hospitals, numerous churches and private schools.

INDUSTRIES. The industries of Altoona center principally in the immense railroad shops which cover an area of 150 acres, and which manufacture large numbers of locomotives, passenger coaches and freight cars. Locomotives and cars are also sent here for repair. Other industries include the manufacture of silk goods, agricultural implements and coal-mining machinery.

HISTORY. The site of the city was purchased by the Pennsylvania Railroad Company in 1849 and laid out as a town. A city charter was granted in 1868. Population in 1920, 60,331.

Al'um, commonly a white crystalline substance made up of potassium and aluminum sulphates, and, when so formed, distinguished in name from other alums, as potash alum. It is soluble in water and has a peculiar sour taste. Upon application of heat the crystal is reduced with loss of water to a fine powder called burnt alum. Alum is generally prepared by bringing together the required proportions of aluminum and potassium sulphates; or by treating alunite, a natural compound containing alum, with sulphuric acid and water. At Talfa, near Rome, where considerable alunite mining is carried on, the alunite is simply heated and washed. The water dissolves the potash alum, which is afterward crystallized. This alum, called Roman alum, has a slightly reddish color due to the presence of iron. Alum is used to fix colors in dyeing and is a constituent of some medicines.

Aluminum, *Al oo' min um,* or **Alumin'ium,** the most abundant metal, though never found uncombined. It is a tin-white element, extremely malleable and a good conductor of heat and electricity. It is very hard, and melts more easily than silver.

Aluminum is found in nature in combination with oxygen in the ruby, emerald, sapphire, amethyst, emery and bauxite. Its oxide is a constituent with phosphorus in the turquoise; with silica in

clays; with potassium and sulphur in commercial alum; and with sulphur and sodium in the rare lapis lazuli, or ultramarine.

Pure aluminum is prepared artificially from bauxite by electrolysis. The bauxite, which is an aluminum oxide, is placed in furnaces lined with carbon, in which it is decomposed and melted by the electric current without further application of heat. The oxygen escapes as a gas and the melted aluminum is drawn off through an opening at the bottom of the furnace. This process, which is of comparatively recent origin, is tending to lower the price of aluminum wares. There are large smelters in operation in Niagara Falls and in Pittsburgh.

Beds of aluminum clay are found in Georgia, Alabama and Arkansas. The alloy of copper and aluminum, called aluminum bronze, is its most valuable alloy, and alum, burnt alum and complex salts of aluminum which are found in Hungary, are widely used in medicinal and culinary preparations.

Owing to the inactivity of aluminum in uniting with oxygen, its lightness, luster and ductility, it is put to many uses commercially. Cooking utensils of aluminum are now common; fine wire of aluminum is taking the place of copper, especially for electric purposes; in dyeing, aluminum compounds are used as mordants, since they are able to form insoluble compounds which fix the colors in the cloth; from leaf-aluminum titles are stamped upon books; and from clay containing aluminum, called kaolin, the best porcelain is made. It would be used in preference to iron for building purposes, were not the expense of separating it from its clays, too great at present to make its use advisable. For tips of lightning rods and for hairpins, ferrules, combs and cups it is in common use.

It is interesting to note that the cap of the Washington Monument, which also serves as the top of its lightning rod, is a thin sheet of aluminum weighing about six pounds.

Al'va, or **Alba, Fernando Alvarez de Toledo,** DUKE OF (1508-1582), a Spanish general. Carefully educated in military matters, the age of 16 found him on the battlefield. He was engaged by Charles V of Spain to conduct campaigns in France, Italy, Germany, Hungary and Africa; and by Philip II to reduce Netherlands to subjection. It was his boast that he had sent 18,000 men to execution.

Alvara'do, Pedro de, Spanish conqueror in America, born near the close of the 15th century. He sailed for Cuba in 1518, and the following year became associated with Cortez in his expedition against Mexico. He conquered Guatemala, of which he became governor, and subsequently received the governorship of Honduras. He was killed in a fight with the Indians in 1541.

Al'verstone, Lord (1842-1916), formerly Richard Everard Webster, a noted British lawyer and jurist. He began the practice of law at Lincoln's Inn in 1868 and represented the Isle of Wight in Parliament from 1885 to 1900, when he was created Lord Alverstone and chief justice of England. He was a member of several arbitration bodies, the most notable being the tribunal of 1903 for settling the boundary of Alaska, and over which he presided. He cast the deciding vote sustaining most of the American claims.

Amal'gam, a mixture of different metals in which mercury is employed. Gold and silver amalgams sometimes occur in nature, but most of them are artificial products. The great affinity of mercury for gold is made use of in mining operations, in the recovery of the particles of gold from the crushed and powdered gold-bearing gravel or quartz. Amalgams consisting of mercury and silver, and sometimes of copper and mercury, are employed in a quick and ready method of filling teeth. Amalgams composed of one part tin to three parts of mercury were formerly used for making mirrors; but of late silver nitrate is employed in silvering the backs. See MERCURY; MIRROR; ALLOY.

Am'aranth, a name applied to a number of weeds and herbs of the Amaranth

Family. The most common species are prince's feather, love-lies-bleeding, coxcomb, tumbleweed and white pigweed. They are mostly common, rough weeds, pale green in color and having erect stems. The flowers are also green and surrounded by a circle of dry scales which retain their color in the fruit; hence their name, which means unfading. The globe amaranth, a native of South America, has brilliant purple flowers. The amaranth is the symbol of immortality.

Am"aryl'lis, a family of woodland plants not unlike the lilies in form and manner of growth; in fact, many members of this family are called lilies and were once classed in the Lily Family. They are chiefly perennial herbs that grow from a bulb and have bitter, sometimes poisonous juice. The leaves have no distinction of blade and stem, and the flowers are generally showy, regular blossoms whose parts are in threes. Its flowers differ from the lilies in having their petals and sepals attached to the undeveloped seed-case, or ovary. Many of the tropical members of the Amaryllis Family have been brought to greenhouses and have become among the choicest of cultivated plants. The narcissus, jonquil, daffodil, snowdrop, Atamasco lily, tuberose and century plant are all members of the family.

Am"aril'lo, Tex., the county seat of Potter Co., situated 337 m. n. of Ft. Worth and 275 m. w. of Oklahoma City, Okla., and on the Santa Fe, the Chicago, Rock Island & Pacific, the Ft. Worth & Denver and other railroads. The city is in a fertile agricultural region and is an important distributing center. The elevation of 3600 ft. above sea level gives Amarillo a clear bracing atmosphere and a healthful climate. The public buildings include a courthouse, city hall, opera houses, several fine churches and school buildings. The Santa Fe has railroad shops and yards here. The leading industrial establishments include ice factories, marble and concrete works, brickyards, grain elevators and flouring mills. The city has waterworks, electric lights, street cars and all modern improvements. Population in 1920, 15,494.

Am'azon, a river of South America, formerly known as the Orellana. The word is of Indian origin, and means boat-destroyer, suggested by the dangers of the tidal action at the mouth of the river. Its sources, the Marañon and the Ucayali rivers, rise in the northern Peruvian Andes, and its course is chiefly north and east until it empties into the Atlantic Ocean. From its headwaters its length is about 3300 m.; at its mouth its maximum width is 150 m. Receiving rivers from both the north and the south, it drains an area of about 2,500,000 sq. m., and with these tributaries it constitutes one of the most extraordinary inland waterways in the world. The falls and rapids along its upper course grow less frequent nearer the mouth, where, however, the tides, winds and currents cause great turbulence. It is estimated that from 4,000,000 to 5,000,000 cu. ft. of water are discharged every second, and this tremendous outpour rushes into the ocean with such violence as to raise waves to the height of 10 to 15 ft.

The Amazon basin is rich in animal life and swarms with insects, birds, often songless but gayly colored, anacondas, alligators, turtles, jaguars and panthers. Plant growth is uninterrupted throughout the year, due to the tropical climate. There is a profusion of vegetation, much of which is yet unexplored. In the dense forests is a fantastic interweaving of vines and mosses. Commercially, the Amazon develops in importance with the growth of Brazil. It is navigable by large steamers for about 2200 m. It was discovered by Yanez Pinçon in 1500. In 1853 steamboat navigation began and in 1867 the river was opened to world navigation.

Amazons, a mythical nation of warlike women who seared off the right breast in order to facilitate the handling of the bow. They treated their men as menials, and sent away or destroyed all male offspring, raising only girls. The Amazons of western Africa were the more ancient, numerous and warlike.

Under Queen Myrina, they established friendly relations with Egypt and subdued Arabia, Syria, parts of Asia Minor and Thrace. More famous, however, were the Asiatic Amazons, who dwelt in Pontus and carried their invasions into Attica. One of their queens, Hippolyta, was slain by Hercules, who stole her girdle. Another, Penthesilea, was killed by Achilles during the Trojan War.

Ambassador. See DIPLOMACY, subhead *Ambassador.*

Am'ber, a resin which exuded from the trunk of the amber fir and is now found in fossilized state. It is a yellowish-brown, half-transparent resin of nearly the same chemical composition as copal, and is valuable because of its hardness, its soft coloring and its rarity. It is mined in regions of the Baltic Sea, where it is found in greatest abundance. Because it contains the fossil remains of animals and plants that are now extinct, it is believed that the amber exuded from the tree as a thin liquid. Amber is easily electrified by rubbing and it was by this operation that the first artificial electrical phenomenon was observed. Probably this display was the cause of amber's being considered a charm against disease and evil spirits. It is used in the manufacture of beads, hard varnishes and the mouthpieces of pipes.

Ambergris, *Am' ber grees,* an ash-colored, fatty, inflammable kind of wax. It comes from the intestines of the sperm whale, and is derived from the fat of the cuttlefish, on which this whale feeds. Ambergris is used as a basis of many perfumes. See WHALE.

Am'brose, Saint (about 340-397), Bishop of Milan, one of the early Fathers of the Latin Church, noted for modesty, gentleness and wisdom. He was born at Trèves in Gaul, where his father was Roman governor. His mother was a Christian and educated him along religious lines. He was a zealous worker in support of orthodoxy and in his efforts to overcome Arianism. In 387 he founded the famous Church of St. Ambrose at Milan, and afterwards the Ambrosian Library. He was an adviser of Augustine and wrote several treatises which are still regarded as authoritative. His contributions to Christian psalmody were his most worthy and useful productions. Among his other works are *Widows, Duties of Ministers, Virginity, Penance* and *Faith and the Holy Spirit.*

Ambro'sia, the celestial food of the gods, which, with nectar, was the source of their perpetual youth. This was served in the great palace hall of Jupiter. It was also used as an anointment. Administered to man, it made him immortal.

Am'bulance, a wagon designed for carrying sick and injured persons. All American cities of importance have their police departments equipped with ambulances, which are in charge of experienced surgeons. Ambulances are also attached to all hospitals. Ambulances have the right of way over other vehicles and respond at once to a call for help. In armies the term is applied to movable hospitals, controlled by the Red Cross Society.

Amendment, the act of modifying or proposing a modification in a bill; an act or a motion in any deliberative body. When amendments are made in either house of Congress upon a bill which has passed the other, the bill, as amended, must be sent back to the other house for concurrence. In parliamentary bodies a bill, resolution or motion may be amended and this amendment may be amended, but the amendment to the amendment cannot be amended. Since the adoption of the Constitution of the United States, 19 amendments have been added. The Thirteenth, Fourteenth and Fifteenth amendments were ratified after the Civil War; all refer to the abolition of slavery and to the status of those who had been in rebellion against the United States.

Amer'ica. See HYMNS, NATIONAL.

America. See NORTH AMERICA; SOUTH AMERICA.

American Association for the Advancement of Science, The, one of the most widely known scientific societies in America. It was founded in Philadelphia in 1840, under the name of the

Association of American Geologists, but was reorganized under its present name in 1847. The purpose of the association is to promote scientific work and research and to influence all important scientific movements. It is divided into nine departments as follows: mathematics and astronomy, physics, chemistry, mechanical science and engineering, geology and geography, zoology, botany, anthropology, economics and statistics. The membership exceeds 4000 and includes the most prominent American scientists and educators and other men of note who are interested in the work. The association holds annual meetings and publishes an annual volume of proceedings, which is one of the most valuable contributions to scientific literature. The magazine *Science* is the official organ of the association and is sent to all members.

American Federation of Catholic Societies, a federation of the various organizations within the Roman Catholic Church in the United States for the purpose of "cementing the bonds of union among the Catholic laity and the Catholic societies of the United States; the fostering and protecting of Catholic interests and works of religion, piety, education and charity; the study of social conditions; and the encouragement and spread of Catholic literature and of the circulation of the Catholic press." The society was founded in 1901 and includes 19 national organizations and many state and local organizations. The total membership is over 3,000,000. The general offices of the federation are at Cincinnati, Ohio.

American Federation of Labor. See LABOR, AMERICAN FEDERATION OF.

American Forestry Association, an association organized in 1882 for the purpose of protecting the forests of the United States. It was incorporated in 1897, holds annual meetings and has a membership of over 2000. The society uses its influence in securing legislation favorable to the preservation of our forests, and endeavors in a general way to increase the public interest in the preservation of forests and to awaken the public conscience to demanding the legislation necessary for the purpose. It publishes *Forestry and Irrigation,* which is its official organ. The general office is at Washington, D. C. See CONSERVATION; FORESTRY.

American Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *American Party.*

American System. See TARIFF, subhead *United States.*

Amer'icus, Ga., a city and the county seat of Sumter Co., about 71 m. s.w. of Macon, on the Central of Georgia, the Seaboard Air Line and other railroads. The section of the state in which it is situated is highly productive agriculturally, the principal crops being cotton, sugar cane and fruit. There is a large trade in cotton and stock (horses and mules). Manufacturing is an important activity, the leading factory products being cottonseed-oil, chemicals, fertilizers, carriages, wagons, harness and iron. There are railway repair shops. Americus was settled in 1832, and in 1855 was incorporated; it is administered under a revised charter of 1889. Population in 1920, U. S. Census, 9,010.

Amer'icus Vespu'cius (1451-1512), a Florentine maritime explorer, from whom the American continents were named. For the Spanish, in 1497-99, he explored the South American coast for several hundred leagues, and in 1501, under the flag of Portugal, skirted the shore of the continent from Cape St. Roque to the Gulf of Venezuela. Another voyage was made in 1503. After 1508, as pilot-major to the King of Spain, he occupied himself with the examination of pilots, collection of data and supervision of the dispatch of expeditions to the New World. In 1504 Vespucius completed an account of his voyages, and his narrative was translated, in 1507, by a German geographer, Waldseemüller. The latter suggested that inasmuch as Vespucius had been the first to make known the southern continent it be named for him. The suggestion was adopted and the

name appeared on printed maps, finally being applied to both continents.

Ames, Fisher (1758-1808), an American statesman and orator, born at Dedham, Mass. He began the study of Latin at six, entered Harvard at 12 and graduated at 16, beginning the practice of law in 1781. He first came into prominence through the publication of political essays in the Boston journals, was elected to the State Legislature in 1788, and, the same year, to the state convention for the ratification of the Federal Constitution. He strongly urged the adoption of the Constitution, joined the Federal Party and was the first representative in Congress from his district. Throughout Washington's administration he remained in Congress and became noted for his power as an orator. He was chosen to deliver the funeral oration on Washington before the Massachusetts Legislature. In 1804 he was elected president of Harvard College, but declined on account of failing health.

Ames, Iowa, a city of Story Co., about 37 m. n. of Des Moines, at the intersection of two lines of the Chicago & North Western Railway. In the town are manufactories of wagons and plows. Here is located the Iowa State College of Agriculture and Mechanic Arts, founded in 1869. This institution operates 1175 acres of land and has 32 college buildings, which were erected at a cost of $1,200,000. Courses are offered in agronomy, animal husbandry, veterinary medicine, general science, civil, mechanical, electrical and mining engineering and dairying. Ames has a Carnegie library. The town was settled about 1864 and was named in honor of Oakes Ames, a prominent citizen. It was incorporated in 1869. Population in 1920, 6,270, and 2,500 students.

Ames'bury, Mass., a city of Essex Co., 42 m. n.e. of Boston and 27 m. n. of Salem, on the Merrimac River and on the Boston & Maine Railroad. The town was originally a part of Salisbury and was separated as New Salisbury in 1654. It was incorporated in 1666 and named from Amesbury, England. There are extensive manufactories of hats, shirts, cotton and woolen goods, automobile bodies and lamps, brass castings, thermometers, boots and shoes, mirrors and reflectors and motor boats. Amesbury was for many years the home of the poet Whittier, whose house is retained as a memorial site. Population in 1920, 10,036.

Am'ethyst, a variety of crystallized quartz of violet color. It is found in Siberia, India, Ceylon, Arabia and other places; and in the United States it occurs in quantities on the shores of Lake Superior. It is used as a precious stone in the manufacture of jewelry. With the ancient Greeks it was supposed to be a protection against drunkenness. See QUARTZ.

Am'herst, a city of Canada in the Province of Nova Scotia near the head of Cumberland Basin, on the Bay of Fundy and the Intercolonial Railway, 72 m. n.w. of Truro. The city is surrounded by fertile marshes and is a manufacturing center. Among the leading industrial establishments are a foundry, large railway-car works, engine and boiler works, carriage, trunk and builders' factories, rolling, woolen and tweed mills, stone quarries, gypsum works and manufactories of boots, shoes, suspenders, porcelain, enamel, coffins and fur goods. Population, estimated 12,000.

Amherst College, at Amherst, Mass. (1821). This is an institution for men only, established by an association of Congregational ministers following the opening of Amherst Academy in December, 1814. It opened its doors in 1821 and was chartered in 1825. It has a productive endowment of about $3,000,000, and the asset of a high reputation, won by its efficient service in the field of classical and general culture. The faculty numbers about 50 and the average enrollment is over 500. A large number of its 4500 graduates have become teachers or clergymen. Noah Webster was the first president of its board of trustees.

Amherst, Jeffrey, BARON (1717-1779), an English soldier. He was born at Riverhead, Kent, and served as page in the household of the Duke of Dorset,

through the influence of whom, in 1731, he obtained an ensigncy in the army. He soon beame aid-de-camp to General Ligonier, and saw active service in the War of the Austrian Succession and in the Seven Years' War. In 1758 he became major-general, and was given command of the expedition against the French in North America. After his capture of Louisburg, he superseded Abercrombie as commander-in-chief of the British troops in America. In 1759 he captured Ticonderoga and Crown Point and, in 1760, he forced the surrender of Montreal. For this he was made governor-general of British North America. He was unfamiliar with Indian tactics and, consequently, could not suppress the conspiracy of Pontiac. He returned to England in 1763, being made governor of Virginia that same year and of Guernsey in 1770. In 1772 he was acting commander-in-chief of the English army and was thus chief adviser at headquarters during the Revolution. In 1776 he was made a peer. Amherst became a general in 1778, was commander-in-chief from 1793 to 1795 and field marshal in 1796. He died at "Montreal," his home in Kent.

Amherst, Mass., a city of Hampshire Co., 98 m. w. of Boston and 23 m. n.e. of Springfield, on the Vermont Central and Boston & Maine railroads. The scenery is picturesque, commanding beautiful views of the Connecticut Valley and Mt. Holyoke. It is best known as the seat of Amherst College, founded in 1821. This college is situated on an eminence which commands an extensive and beautiful view. The Massachusetts State Agricultural College and the State Experiment Station are located here. Straw-hat manufacture is the principal industry but there are also manufactories of paper, leather and other articles. The town was named in honor of Gen. Jeffrey Amherst, in 1759. Population in 1920, 5,550.

Amicis, *Ah mē' chees,* **Edmondo de** (1846-1908), a popular Italian writer, born in Liguria. He abandoned his early military and journalistic career with his successful publication of *Bozzetti,* a volume of army sketches. Subsequent travels in England, Holland, Spain, Africa, Turkey and South America resulted in his brilliant volumes of travel, which have been widely translated. *The Heart of a Boy,* a diary of an Italian schoolboy, is his most popular work.

Amiens, *Am'i enz,* a city of France on the Somme River, 81 m. n. of Paris. The city is widely known for its cathedral, which is the largest in France and one of the best illustrations of Gothic architecture. Other public buildings are the lyceum and the public library.

In the great German offense of 1918, Amiens was one of the points of attack. Its capture would have opened the way to the coast and separated the British army from the allied forces defending Paris. Some of the most desperate fighting in the war was in the neighborhood of the city to the northeast and east. Population, about 91,000.

Am'meter. See ELECTRIC METER.

Am'mon, the Jupiter of the Egyptians, represented as a human being with head and horns of a ram. A temple was erected to his honor in the Libyan oasis. Here oracles were interpreted. This temple was very rich with votive offerings.

Ammo'nia, a gas chiefly known through its water solution called aqua ammoniæ or spirits of hartshorn. It is a compound of nitrogen and hydrogen and occurs in small quantities in the air and in combination with other substances or in solution in rain water. It is produced by the decay of any organic substances which contain nitrogen, and has received its name from the fact that ammonium chloride was early found near the Temple of Jupiter Ammon in Egypt, where it results from the decay of animal matter. Its composition was first studied by Priestley in 1774. Ammonia is a colorless gas, lighter than air and having a penetrating odor. It dissolves easily in water, and this solution has all the properties of the gas. Ammonia is easily liquefied with a liberation of heat, and this heat is reabsorbed when the liquid

evaporates, a fact made use of in the manufacture of artificial ice and in cold storage. Aqua ammoniæ is used as a deodorizer and in medicine and the arts.

Am'monite, a remarkable family of fossil Mollusks. From the specimens which are now found in a fossilized state they are known to have been exceedingly abundant at one time, and over 500 species are classified. The ammonite shell is a flattened or elongated coil consisting of many chambers; from this protruded a head bearing numerous tentacles and four gill flaps. Some authorities claim that the shell was almost entirely enclosed by the flaps of the mantle, or thickened skin, in such a manner that during the life of the animal only a small portion was visible.

The ammonites are chiefly interesting because of the curious manner in which their shells were accounted for by early naturalists who found no trace of the animal which had produced them. They are variously spoken of as petrified ram's horns, which the elongated ones greatly resemble, petrified worms, marine insects, or serpents' tails. Dealers in curios at one time found great demand for these when they were fitted with ingeniously carved serpents' heads. Some naturalists adopted a phrase, which has been frequently used to cover lack of knowledge, and spoke of them merely as freaks of nature.

Amœba, *A me' ba,* a family of the simplest animals and belonging to the group known as Protozoa. The different species may be found in the ooze at the bottom of a pond or in the slime and mud taken from standing water. The entire structure consists of a single cell of protoplasm without an enclosing cell wall and in which lie a dense portion called the nucleus and one or more clearer portions known as vacuoles. The animal is without head, body or organs of any sort; or, more properly speaking, the entire cell acts as any of these organs. It moves by allowing the protoplasm to stream out in one direction, causing a consequent shrinkage in other directions; by means of these temporary projections, called pseudopodia, it accomplishes a slow motion. As it grows out in a certain direction, if it encounters a particle of food the body surrounds it, and soon the particle may be seen within the jellylike mass, where it is rapidly digested. If the particle proves indigestible the body of the amœba streams away and leaves it behind. Thus the amœba may be said to be all feet, all mouth, or all stomach.

Amœbas reproduce by a simple process of cell division by which the nucleus first divides, and later the entire cell separates, one portion of the nucleus entering each part. Two new individuals are thus formed.

A'mos, a book of the Old Testament; also the name of the author of this book, one of the 12 minor Hebrew prophets. The prophecies of Amos were made within the 25 years covering the period when Uzziah and Jeroboam II were contemporary kings of Judah and Israel respectively. Previous to his advent as a prophet Amos had been a shepherd of Tekoa in Judah and a dresser of sycamore trees. The book of *Amos,* which is characterized by great vigor and animation of style, includes a denunciation of the sins of the nations bordering on Israel and Judah, a description of the state of those two kingdoms, a sketch of Israel's impending punishment, and a portrayal of the coming of the Messiah and the final restoration of the Lord's people. See BIBLE, subhead *The Old Testament.*

Ampere, *Am par'.* See ELECTRIC CURRENT.

Ampère, *On"par',* **André Marie** (1775-1836), a French mathematician and physicist, born at Lyons. He became professor of physics at Bourg in the Department of Ain at the age of 26, and afterwards held a professorship in mathematical analysis in the Polytechnic School of Paris, gaining considerable reputation. In 1814 he was elected a member of the Academy of Sciences, and 10 years later was appointed professor of experimental physics in the College of France. For 16 years before his death he devoted his attention to the phenomena of electromagnetism and pro-

duced a number of scientific and philosophical writings. His name is in constant and practical use in the term *ampere,* employed to designate the unit of electrical current.

Amphibia, *Am fib' i a.* See BATRACHIA.

Amphictyonic, *Am fik" ti on' ik,* **Council,** a confederation of tribes in ancient Greece for the purpose of worship and the protection of sacred lands and treasures. The confederation included the 12 northern tribes, each of which sent two deputies to the council, which met alternately at Delphi and Thermopylæ. In addition to its original duties, the council exerted a strong influence over political affairs, and discussed international relations and questions affecting the union of the tribes.

Amphion, *Am fi' on,* a Theban prince of mythology, son of Antiope and Jupiter and husband of Niobe. While living with shepherds, before he had come into his inheritance, he had been instructed in music by Mercury, who also gave him a golden lyre. So proficient did he become that, when as sovereign he wished to build a wall around Thebes, all he had to do was to play his lyre and huge stones swung into place.

Am'sterdam, the chief city of Holland, situated on one arm of the Zuider Zee. Canals divide the city into a number of islands, and as the site was originally a peat bog, several of the buildings are supported by piles. The old houses are quaint and picturesque with their gables and towers, but modern Amsterdam has many stately and handsome homes. The features of interest include the Nieuwe Kirk, the palace distinguished for its splendor and architectural beauty, the synagogue of the Portuguese Jews, the Ryks Museum, the Free University, the state university, Vondel Park, the "Weepers' Tower" and the zoological and botanical gardens. The educational and charitable institutions are numerous and of a high character. The large harbor has several docks with modern improvements. The city is rather a trading than a manufacturing town, and its extensive commerce has made it one of the first centers in the world. Diamond cutting is the principal industry. Other industries of importance are the refining of sugar and the manufacture of soap, oil, glass, iron and dye, shipbuilding, distilling and tanning. The Amsterdam Exchange is still important, and was once the center of the banking business of the world. The forced union of Holland with France in 1810 nearly ruined the trade of Amsterdam, but it has since revived. Population in 1919, 628,404.

Amsterdam, N. Y., a city of Montgomery Co., 33 m. n. w. of Albany, on the north bank of the Mohawk River, on the Erie Canal and on the New York Central & Hudson River, the West Shore and other railroads. The city is situated in a rich agricultural region, and the hills on both sides of the river command extensive views of the Mohawk Valley. There are many handsome residences. Interurban electric lines extend to Albany, Troy, Fonda, Gloversville, Johnstown and other near-by towns and cities.

INSTITUTIONS. The educational institutions include an academy, public library, St. Mary's Institute (Catholic) and high school. Among the other institutions are two hospitals and homes for aged women and children.

INDUSTRIES. Amsterdam is well known as an industrial center and has extensive manufactories of carpets, rugs, knit goods, hosiery, silks, silk gloves, brushes, woolen goods, electrical apparatus, carriage and wagon springs, paper and paper boxes, dyeing machines, brooms, knit goods, tobacco and cigars, buttons, mittens and leather. There are also flour mills, foundries and machine shops, which have a large output of machine-shop products.

HISTORY. Amsterdam was settled in 1778 and was known as Veedersburg until 1804, when its present name was adopted. A city charter was granted in 1885. Population in 1920, 33,524.

Amu', or **Amu-Dar'ya,** a large river of central Asia, rising in the Pamirs between India and Bokhara and flowing

towards the north until it empties into the Aral Sea. There are several minor tributaries in its course through the mountains and continuing for a distance of about half the length, though its value is less for commercial purposes than as a reservoir for irrigation. A distinctive feature of the stream is the fact that it is frequently changing its course.

Amundsen, Roald (1870-), a Norwegian navigator, born in Christiania, Norway, and educated in the public schools. At the age of 25 he joined a South Polar expedition, and on his return he became acquainted with Nansen, the Arctic explorer. Amundsen thus became interested in both North and South Polar regions. In 1902 he organized an expedition to locate the north magnetic pole and discover the Northwest Passage. Early in the following year the expedition left Christiania in the ship *Gjoa,* and in 1905 Amundsen brought his ship through Bering Strait into the Pacific Ocean, being the first to make the passage. On his return Amundsen was honored by the geographic and other scientific societies of the United States and Europe. In 1910 he organized a South Polar expedition, and on Dec. 17, 1911, raised the flag of Norway at the South Pole, accomplishing one of the greatest feats in exploration in the world's history. See POLAR EXPLORATIONS.

Amur', a river of Asia, formed by the confluence of the Shilka and Argun rivers at the northern end of the Khingan Mountains. It flows east and southeast, forming the northern boundary of Manchuria, and empties into a strait which opens into the Sea of Okhotsk and separates the Sakhalin Island from the mainland. Its length is nearly 2800 m.; the total area of its basin is about 750,000 sq. m. The principal tributaries falling into it are the Sungari, Ussuri, Zeya and Bureya rivers. Along its shores are Blagovieshtchensk, the capital of the Amur territory, Khabarovsk, the station of the steamers navigating the waters of the river, and Aigun. For six months of the year it is open to commerce, and as early as 1860 it was controlled by the Russians and became significant as an important ice-free port and outlet on the Pacific. The territory surrounding the river played an important part in the Boxer uprising of 1900 and in the Russo-Japanese War. See RUSSO-JAPANESE WAR.

Anab'asis. See XENOPHON.

An"acon'da, or **Water Boa,** one of the largest serpents and a member of the Boa Family. It is native in tropical South America and is commonly found coiled about trees or lying in the water in wait for the smaller Mammals that come to drink. When the streams dry the anaconda becomes torpid and shows no activity until the rains again moisten its resting place. The anaconda is beautifully marked; its back is gray, brown or olive in color and has deeper brown or black, regularly arranged spots. Like all boas the anaconda crushes its prey, but it is devoid of poisonous fangs. The young, which are numerous, are born alive. See BOA CONSTRICTOR.

Anaconda, Mont., a city and the county seat of Deer Lodge Co., 26 m. n. w. of Butte, on the Northern Pacific, the Butte, Anaconda & Pacific, the Great Northern and other railroads. In the vicinity are vast deposits of copper ore; graphite, gold and sapphires are also found. The copper-smelting works at Anaconda, owned and operated by the Anaconda Mining Company, are among the largest in the world, having a daily capacity of about 12,000 tons of ore. This smelter, known as the Washoe, has the distinction of being the largest copper smelter in the world. Other plants representing the city's remaining industries are machine and railroad shops, brick plants, iron and brass foundries, pattern shops and manufactories of furnaces, steel converters, rock crushers and mining machinery. The Hearst Free Library was the gift to the city of Mrs. Phœbe Hearst. There are also parks, theaters, hotels, good business blocks and a number of handsome churches. The development of Anaconda's schools has kept pace with the city's progress, and

the city contains a number of the finest school buildings in the state. The place was founded in 1884 with the establishing of the first smelting works, and has grown with the copper industry until Anaconda has become one of the leading cities of the state. There are also vast agricultural and stock-raising districts directly tributary to the city. Poulation in 1920, U. S. Census, 11,668.

Anacreon, *A nak' re on* (561-476 B. C.), a lyric poet of Greece, born at Teos, in Ionia. He was patronized by Polycrates of Samos, by Hipparchus of Athens and by the Thessalian prince, Echecrates. After his death, Teos had his image on its coins, and his statue was on the Acropolis of Athens.

Anæsthetic, *An" es thet' ik,* an agent which is capable of deadening the sensibilities and so relieving pain and permitting otherwise distressing surgical operations to be performed without discomfort to the patient. The name anæsthetic was probably first applied by Dr. Oliver Wendell Holmes; it includes both local and general anæsthetics. The effect following the taking of many pain-relieving drugs has been known for some time, but the use of chloroform and ether in medicine is of comparatively recent date. Ether was the first to be put to practical purposes and was probably so used about 1842 by a Dr. Long of Georgia. In 1847 Dr. Simpson of Edinburgh demonstrated the value of chloroform. Since then the use of the two anæsthetics has been wide in dentistry and pure medicine, and by means of it the practice of surgery has increased in scope and value. Both ether and chloroform are practically safe anæsthetics, the former being somewhat more disagreeable in its after effects but less dangerous. Cocaine is a popular local anæsthetic greatly used by dentists and oculists. New methods of applying anæsthetics are constantly being introduced, their object being the elimination of the disagreeable after effects and the slow recovery of consciousness accompanying the use of ether or chloroform See CHLOROFORM; COCAINE; ETHER.

Ananias, *An"a ni'as,* the name of three characters found in the Bible. The first was a disciple who, with his wife, Sapphira, sold his land and held back a part of the price, but told the disciples that they were giving it all. Both were struck dead for the false report (*Acts v,* 1-10). The second character was the high priest (*Acts xxiii,* 2). The third was the disciple at Damascus (*Acts x,* 10-17).

Anarchism, *An' ar kiz'm,* a political and social theory founded upon the principle that the individual is entitled to freedom from all civil authority. The advocates of anarchism claim that it represents the highest ethical ideal of society. But in practice it has always proved disastrous.

Anatolia is the peninsula part of Asia Minor, north of Alexandretta Bay and west of Armenia. It is the heart, the nucleus of the Turkish Empire. While not the home land of the Turks, it is the section of country where they experienced their political development from a nomadic people to a warrior nation that at one time threatened to overrun most of Europe. It was not only the cradle land of the Turkish nation but it is the restricted area to which that nation seems destined to revert. The Anatolian Turks are the only pure representatives of the conquering Turks of centuries ago, and are the best specimens of the race. This description applies only to the inhabitants of the elevated table land some distance back from the long and curving coast line. It has no reference to official Turkey, except that the ruling house comes from thence. Restricted to their ancient homeland with the mixed population of the entire lowland section along the sea board, and the official bureaucracy of Constantinople cut off, there may be a future ahead of the Turkish population of Anatolia.

Anat'omy, a term used to denote the study of the structure of living things. Thus we have animal anatomy and plant anatomy and many subdivisions. Animal anatomy includes comparative anatomy, or the study which compares the structure of different animals, and special anatomy, in which the study is limited

to one animal body. Human anatomy, which in one of its classifications may be placed in the latter division, is the most important department of animal anatomy.

Descriptive anatomy, when applied to human anatomy, embraces a study of the exact form, position, size and relationship of the various structures; microscopic anatomy, or histology, is a study of the atoms which go to make up the principal parts. Under the head of physiological anatomy are normal anatomy and pathological anatomy, which deal respectively with the body in a state of health and as affected by disease. The subject is so extensive and complex that many physicians, after obtaining a general knowledge of anatomy, specialize on some one organ or set of organs, as the eye, the nerves, or the digestive organs.

The importance of dissection as a means to a complete understanding of the various parts of the animal body was little understood by the ancients, and their knowledge of it, therefore, was superficial. The Greeks were the first, so far as we know, to dissect the human body for the purpose of understanding its structure. Among them Aristotle, who may be called the founder of comparative anatomy, and Galen, who apprehended the functions of several organs, are conspicuous. But the practice was not general. In the 13th century Frederick II of Germany authorized a public dissection, to take place every five years; and later, in various parts of Europe the custom of holding dissections for those studying medicine became more or less general and frequent. The first scientific treatise, based upon an accurate study of the body, was written in 1543 by Andreas Vesalius and called *The Structure of the Human Body*. Since the last half of the 18th century and during the 19th century an enormous advance in anatomical study has been made, and the knowledge gained has been used in the advancement of medical science. See SKELETON; MUSCLES; NERVOUS SYSTEM; BRAIN; and related subjects.

An"axag'oras (about 500-428 B. C.), an early Greek philosopher, born at Clazomenæ, in Ionia, of a rich and influential family. Soon after the Persian War he removed to Athens and transplanted philosophy from Ionia to its more famous future home, which thenceforth became the center of intellectual life in Greece. Among his pupils were many distinguished Athenians, including Pericles, Euripides and perhaps Socrates. After a residence of 30 years in Athens he was banished on a charge of defaming the gods, and died in exile. The significance of Anaxagoras is that he introduced into philosophy the idea of a world-forming intelligence. He directed attention to the thought-principle of the universe, thereby closing the earliest or nature philosophy and opening the way for the new development.

Ancestor Worship, the term given to a phase of religious belief and practice common to many of the religions of savages and primitive culture, and continuing in some religions to the present day, notably in that of China. It grows out of a belief that the spirits of the dead are conscious and at hand, and that they may be propitiated and importuned in behalf of the living, whom they have the ability to serve because of their increased knowledge and power in their present state.

Anchor, a heavy instrument of wrought iron or cast steel, with two spadelike hooks called *flukes,* commonly pointed in opposite directions, but in the modern patent anchor, side by side. The anchor is used to prevent a ship from drifting. It was invented in times of great antiquity, since the larger boats of that time could not be held by weights used then as now in anchoring small boats. Very light anchors are called *kedges.* They weigh from 100 to 1000 lb. All seagoing ships carry several anchors; one on each side of the bow, and others, called *sheet* anchors, which are stowed farther back. Battleships carry anchors which weigh from seven to ten tons each. The anchor is connected with the ship

by a cable chain, or by a rope if the ship or boat is small.

Anchovy, *An cho' vy,* a family of fish related to the Herring Family, abundant in the warmer parts of the ocean and occasionally found entering the mouths of large rivers. Almost all species are prized as food because of their rich, delicately-flavored flesh. Anchovies have long, tapering bodies, which lack the customary lateral line. The scales are thin and rounding; in coloring the majority are recognized by a broad, silvery band upon each side of the body. The head is somewhat flattened, the snout projecting, and the mouth and eyes are extremely large. The principal species are about four to six inches long and are found in large schools near the shore. They are taken in large numbers, salted, packed and shipped to all parts of the world. The commonest species are the silvery, the striped, the western and the California anchovies.

Ancient Order of United Workmen, a fraternal and benevolent order organized at Meadville, Pa., in 1868. The supreme lodge is the general governing body. There are state lodges and subordinate lodges. The order has over 40 state lodges, over 4500 sublodges, and over 400,000 members. Over $300,000,000 have been expended in benefits.

Ancile, *An si' le,* a sacred shield that fell from heaven. Upon its safety, so the nymph Egeria warned, depended the preservation of Rome. Emperor Numa, therefore, had 11 exact duplicates fashioned, in order to prevent the original from falling into the hands of thieves so readily. These shields were kept in the Temple of Vesta, where 12 priests, called Salii, guarded them. On the first of each March they were borne through Rome in solemn procession, which inaugurated a three days' festival to Mars. Ancient coins bear the stamp of the ancile.

Andalusia, *An" da loo' she ah,* a district in the southern part of Spain having an area of about 35,500 sq. m. and including the modern provinces of Seville, Huelva, Cadiz, Jæn, Cordova, Granada, Almeria and Malaga. The region is rich in minerals, and there are valuable copper mines in Huelva. Much of the district is mountainous. The Guadalquivir is the principal river. The soil in the valleys is fertile, and olives, dates, bananas and grapes are raised. On the higher lands, the cultivation of corn and barley, keeping bees and raising silkworms and the cochineal are also profitable. The live stock is the best in Spain. The inhabitants are descendants of the Moors. Population, about 3,560,000.

An"damans', a chain of islands along the eastern part of the Bay of Bengal, politically attached to British India. They lie 680 m. s. of the mouth of the Ganges River. The Great Andamans consist of the North, Middle and South islands; among the Little Andamans are Henry Lawrence, Interview and Outram. There are large forests and the soil is very fertile. The inhabitants represent a primitive culture and are skillful in swimming, diving, canoeing and archery. Since 1858 the islands have been used by India as a penal settlement. The convicts represent four-fifths of the total population, which exceeds 18,000.

An'dersen, Hans Christian (1805-1875), Danish novelist, poet and writer of fairy tales, born in Odense. His parentage and early childhood seemingly gave no promise of his future greatness. His father was a poor cobbler, his mother was too shiftless to train him properly, and the family ate, slept and worked all in one room. Little Hans was an odd, ugly child, whose peculiarities separated him from the companionship of other children. His father died when he was 11 and the boy was left to his own devices. He stopped going to school, built himself a toy theater, and amused himself with this plaything and by reading all the plays he could lay his hands on.

In 1818 a troupe of opera singers came to Odense. Hans managed to see the performances from behind the scenes, became possessed with the notion that he was fitted to be a great actor, and shortly afterward started to Copenhagen (1819) to make his fortune. After some harrowing experiences he fell in with the

kind-hearted director of the Royal Theater, through whose influence he was sent to school at Slagelse. Before starting to school he published his first volume. Hans was a very reluctant pupil, but he remained at school until 1827 and on his return to Copenhagen continued to study under a tutor.

The publication of some volumes of poems and travel sketches gained him the favor of King Frederick, the result being a small pension (1833) and a trip to southern Europe. Andersen achieved a genuine success in 1835 by his novel, *The Improvisatore,* founded on his impressions of Italy. In the same year appeared the first series of his celebrated *Fairy Tales,* the stories that most admirably express his peculiar genius. These stories continued to appear at intervals until near the close of his life.

Andersen made several other journeys in Europe and at one time stayed several weeks with Charles Dickens. He wrote sketches of his travels, which are charmingly told, several romances and some unsuccessful dramas, but his reputation rests mainly on his fairy stories. Andersen's charm as a writer in this field is due to the fact that he entered so completely into child-nature; that he did not like children and was unattractive to them is one of the many odd things connected with his peculiar nature. At the time of his death he was known and loved all over the reading world, and his fame as a writer of fairy stories is undimmed as time goes by.

Anderson, Ind., a city and county seat of Madison Co., 35 m. n. e. of Indianapolis, on the West Branch of the White River, at the junction of the Cleveland, Cincinnati, Chicago & St. Louis, the Pittsburgh & St. Louis and other railroads. It is also the center of an extensive system of electric traction lines, which connect with all the important towns and cities in northern and central Indiana. Anderson is situated in a fertile agricultural region. A former supply of natural gas aided in making the city a manufacturing center. One of the first and largest tin-plate mills in the United States was established here. The extensive manufactures include wire fence, steel tanks, tin plate, brass goods, paper, wind pumps, carriages, tool workers' supplies, machinery, strawboard, tiles and lumber products. Among the prominent buildings are a government building, courthouse, public library and an orphans' home. The first settlement was made in 1822 and the place was known as Anderson's Town, from "Kik-tha-wenund," or Anderson, the chief of the Delaware tribe, who lived here. The name was changed to Anderson in 1838. It received a city charter in 1865. Population in 1920, 29,767.

Anderson, Robert (1805-1871), an American soldier, born near Louisville, Ky. He was a graduate of the United States Military Academy and took part in the Black Hawk, Florida and Mexican wars, in the last of which he served under Gen. Winfield Scott and distinguished himself in the Battle of Molino del Rey. In the Civil War he served with ability, defending forts Moultrie and Sumter in the capacity of major of artillery. He was promoted to the rank of major-general, but in 1863 his health failed and he retired from active service. His last years were spent in Europe, where he translated from the French several military books, adapting them to what he believed to be American needs. He died in Nice, France. See FORT SUMTER.

Anderson, S. C., a city and the county seat of Anderson Co., about 100 m. n. w. of Columbia, on the Blue Ridge, the Charleston & Western Carolina and other railroads. It lies in the midst of an agricultural region, of which cotton is the principal product. In connection with the cotton industry are operated several manufacturing plants, such as cotton mills and cottonseed-oil presses. In addition to these establishments there are machine shops, lumber mills, flour mills, fertilizer factories and manufactories of bed springs, mattresses, collars, overalls and other wearing apparel. The city has an excellent lighting system, fine public school buildings and a handsome city

hall and county courthouse. The place was settled in 1827 and is administered under a charter of 1882. Population in 1920, 10,570.

Andersonville, Ga., a village in Sumter Co., 62 m. s. of Macon, the site of the most noted Confederate prison for Federal troops during the Civil War. As established in November, 1863, the prison was an unsheltered inclosure of about 22 acres, crossed by a sluggish stream five feet wide and one foot deep. Later five acres were added to the enclosed space, but part of this ground was then rendered useless because a "dead line" was established, to cross which meant death. The pine trees covering the spot had all been cut down. Within this area, at times as many as 33,000 Union soldiers were confined. Of the 49,500 prisoners detained there between Feb. 15, 1864, and April, 1865, almost 13,000 died; 328 managed to escape. During the time of Sherman's march through Georgia many prisoners were removed to Millen, Ga., and to Florence, S. C., where conditions were better. Andersonville is now a national cemetery for Union soldiers. See CIVIL WAR IN AMERICA.

An'des, a mountain range in South America, extending along the Pacific coast from Cape Horn to the Isthmus of Panama. It is about 2500 m. long, has an average breadth of 150 m. and an average height of 12,000 ft. Among the lofty peaks are Chimborazo (20,498 ft.), Cotopaxi (19,613 ft.), Huascan (22,051 ft.), Huandoy (21,089 ft), Illampu (21,490 ft.), Illimani (21,030 ft), Mercedario (22,315 ft.) and Sorata (21,484 ft.). The mountain range presents a steep wall to the ocean, and descends abruptly into the Amazon Valley. There are about 60 active volcanoes, grouped around three distinct centers, namely, in Colombia and Ecuador, in Peru and in central Chile. Those which have been repeatedly in eruption are Cotopaxi, Tunguragua, Ruiz, Omate, Sangai and Tuachela. There are about 100 that are extinct.

The mountain chain is topographically divided into several sections—the southern Andes, a double chain of the central Andes, in Ecuador a drawing together of this outer and inner chain to form a high plateau, and north of this section a breaking up into three distinct ranges. The Andes is the source of almost all the large rivers of South America and forms a natural drainage line, although the streams to the west are short and of slight volume. Along the eastern slope of the system that lies in the equatorial region and forms the basin of the Amazon and Orinoco rivers, the rainfall is at times tremendous. The passes across the mountains are high and difficult, and the chain forms practically an impassable barrier separating wholly the inhabitants on either side. Recent discoveries of the importance of exploiting the rubber and mining resources have slightly improved communication, and Buenos Aires and the ports of Chile are now connected by the Trans-Andean Railway.

Of all the mountain systems in the world, none represents a richer and more varied plant life. The Andes has the climate of the tropical, temperate and frigid zones in varying degrees of altitude. Plant life peculiar to each skirts its base, clothes its slopes and in the subtropical belt extends to a height of 10,000 to 12,000 ft. Palms, cinchona, wax palm, tree fern, the Andean rose and bamboo abound. Where the rainfall is sparse, vegetation is thin. The animals haunting the forests are the monkey, bear, jaguar, puma, ocelot, tapir, capybara, and anteater. Here are also found the condor, llama, snakes, turtles, guanaco, alpaca, bats and an abundant bird, insect and reptile life.

Andor'ra, a small independent state in the Pyrenees practically within the boundaries of France. Its area is about 175 sq. m. and its population about 6000. Andorra has existed as an independent state for over 600 years. It is governed by its own laws, which are administered by two judges, one of whom is chosen by France and the other by the Bishop of Urgel, Spain. Most of the inhabitants are engaged in raising cattle and

sheep. Andorra is the smallest independent state in the world.

Andover, Mass., a city of Essex Co., 23 m. n. of Boston and 10 m. e. of Lowell, on the east bank of the Shawsheen River and on the Boston & Maine Railroad. Andover is noted for its educational institutions. It is the seat of Phillips Academy for boys founded in 1778, and of the Andover Theological Seminary, founded in 1807, the leading educational institution of the American Congregationalists. The Abbott Female Academy is also located here. There are woolen factories, flax mills and manufactories of linen, printers' ink, twine, thread, rubber and other articles. Harriet Beecher Stowe is buried in the private cemetery of the trustees of Phillips Academy. Andover was long the home of Elizabeth Stuart Phelps Ward. It was settled in 1643 and incorporated as a town in 1646. Population in 1920, 8,268.

An'dré, John (1751-1780), a major in the British army during the Revolutionary War. In 1780, under the name of John Anderson, he conducted negotiations with Benedict Arnold for the surrender of West Point to the British. On his return from an interview with Arnold he was captured by three American soldiers. He was tried and executed as a spy. André was a man of exemplary character. In 1821 his remains were removed to England and interred in Westminster Abbey. See ARNOLD, BENEDICT.

An'drée, Salomon August (1854-1897), a distinguished Swedish civil engineer and scientific aerial navigator. He pursued scientific studies at Stockholm, and after successful experiments in aeronautics he determined in 1895 to attempt a flight to the North Pole. He constructed a dirigible balloon with a capacity for gas to last three months, and with two other explorers started from Spitzbergen in 1897. All were lost. A few carrier pigeons, taken by the party, returned with dispatches after several days; but no other messages were received, and there has never been a clue as to the fate of the expedition. A reward was offered for information concerning the unforunate men, and several search parties went out in an effort to trace them, but without success.

An'drew, one of the earliest disciples of Christ. He was originally a follower of John the Baptist. The first person whom Andrew brought to Christ was his own brother, Simon Peter, who was, like himself, a fisherman of Galilee. Little is known of the apostolic history of Andrew, but he is mentioned individually in the feeding of the 5000, where he suggested the lad with the five barley loaves and two fishes, and in two other incidents.

Andrew, John Albion (1818-1867), an American statesman, "war governor" of Massachusetts, born in Windham, Me., and educated at Bowdoin College, where he graduated in 1837. In 1840 he was admitted to the Boston bar, and during his 20 years of practice was prominent in cases arising under the Fugitive Slave Law. After serving in the Massachusetts Legislature, he was a delegate to the Republican National Convention of 1860, and when elected governor of his state took immediate steps to perfect its military organization. He was one of the most efficient of the war governors, lending material aid to Lincoln throughout the conflict, but after the war was equally zealous in advocating conciliatory measures. He was elected governor continuously until 1866, when he retired, resuming the practice of law in Boston.

An'drews, Elisha Benjamin (1844-1917), an American educator and scholar, born at Hinsdale, N. H. During the Civil War he served on the Union side, attaining the rank of second lieutenant. He was educated at Brown University and at Newton Theological Seminary. The chair of political economy and finance at Cornell University, occupied for one year; the presidency of Brown University; the superintendency of Chicago public schools, for two years; and the chancellorship of the University of Nebraska are positions which he has successively filled with eminent success. He has written *A History of the United States in Our Own Times, Institutes of*

Economics, An Honest Dollar, Wealth and Moral Law, Institutes of General History and *History of the Last Quarter Century in the United States.*

Andromache, *An drom'a ke,* daughter of Eëtion, King of Thebes in Cilicia, and wife of Hector. Their son was Astyanax. On the fall of Troy she fell to Pyrrhus, son of Achilles, who took her to Epirus. After his death she married a fellow prisoner, Helenus, brother of Hector. Andromache was famed for her domestic and constant nature. She has been the heroine of tragedies by Euripides and Racine.

Androm'eda, in Greek mythology the daughter of Cepheus, King of Ethiopia, and Cassiopeia. Because Cassiopeia boasted herself fairer than Juno and the Nereids, the offended goddess prevailed upon her brother Neptune to send a sea monster to ravage the country. To appease the wrath of Juno, Andromeda was chained to a crag and there exposed to the mercy of the sea serpent. Just as she was expecting to be destroyed by the monster she was discovered by Perseus, who killed the serpent, liberated Andromeda and made her his wife, so captivated was he by her beauty. After death she was changed into a constellation.

An'dros, Sir Edmund (1637-1714), an English colonial governor in America. He was governor of New York from 1674 to 1681 and served with ability and efficiency, but became involved in so many political disputes that he was removed. He became governor of New England in 1686 and served until 1689, when the people of Boston, tired of his tyranny, arrested him, with 50 of his followers, and sent him back to England. It was during this period that he demanded the charter of Connecticut and it was hidden from him in "Charter Oak." In 1692 he was made governor of Virginia, and served for six years, gaining the esteem of the people by his efforts to promote manufactures and agriculture. He helped to found William and Mary College.

Androscoggin, *An" dros kog' gin,* a river of Maine, formed by the junction of the Magalloway and the outlet of Umbagog Lake. It flows southwestward and enters the Kennebec. Its length is about 160 m. and its course is irregular.

An"emom'eter, an apparatus used to measure the velocity of the wind. Various forms of pressure anemometers have been used for making records of wind velocity; but the instruments in most common use are small wind wheels which communicate their motion to a simple piece of mechanism and thence to a registering dial. In some of these instruments the wind-resisting surfaces have either curved or plane metallic blades arranged to remain stationary or to rotate. In the former the pressure required to keep the fans stationary indicates the force of the wind; in the latter the speed of the rotatory movement serves as the test. Among the apparatus of the rotating sort, that in common use is Robinson's cup anemometer. It consists essentially of an upright rod, to the top of which are attached four horizontal rods placed at right angles to one another. On the end of each rod is placed a hemispherical metallic cup, whose circular rim is in a vertical plane, passing through the common axis of rotation of the vertical rod. The number of revolutions per minute is recorded by clockwork. The ratio between the wind's velocity and the speed of the cups in rotation is 2.5; so that the distance traveled by one of the cups when multiplied by 2.5 will give the velocity of the wind. This is not at all times an accurate test, however, particularly when the wind is variable and the momentum of a sudden gust prolongs the revolutionary movement long after the pressure ceases. In such cases the recorded velocity is far in excess of the actual.

A"nem'one, a name applied to a number of species of the Crowfoot, or Buttercup, Family. The pasque flower, *anemone patens,* is one of the earliest blossoms of the Northern Prairie States and so derives its name pasque, or Easter, flower. It is a low, silky herb with

much-divided leaves which develop after the flower. The blossom is purple and protected by a thick silky coat of hairs which covers the outside of the bud and shields it from the early spring winds of the prairie. This species is often wrongly called the Mayflower. It is the state flower of South Dakota.

The wind flower, or wood anemone, grows upon dry hillsides and is a delicate plant with a slender stem bearing a circle of many-cleft leaves, above which rises a single, nodding white flower. The rue anemone resembles the wind flower closely, but bears a cluster of white blossoms. These two species are common east of the Rocky Mountains. Other species, the Canadian anemone, long-fruited anemone, tall anemone or thimbleweed, and large white anemone, are very similar to the wind flower but are coarser herbs and are found more commonly along roadsides or on rocky banks. The name anemone means wind shaken, and was given by the Greeks because the flowers were supposed to be opened by the wind.

Angel'ico, Fra (1387-1455), the name applied to Fra Giovanni da Fiesole, a celebrated Italian painter, born in Vicchio. In 1407 he entered the Catholic Order of Dominicans and practiced the art of painting as a part of his religious devotions, his subjects, like those of all other artists of the time, being of a religious nature. His work attracted the attention of Cosimo de' Medici, who engaged him to paint the frescoes of the Convent of San Marco in Florence and of the Church of St. Annuziata. These frescoes increased his fame; and Nicholas V commissioned him to decorate one of the chapels of the Vatican. He was humble in spirit and declined offers of position, among them that of the archbishopric of Florence. The work of Fra Angelico (a name attached to him because of his sweetness of character) marked a step in the progress of the art of painting. It is characterized by gentleness of conception, color harmony and delicacy of finish. His most representative frescoes are the *Last Judgment* and the *Coronation of the Virgin.*

An'gell, James Burrill (1829-1916), an American educator, born at Scituate, R. I. He graduated at Brown University in 1849, traveled and studied for several years in Europe, and upon his return became professor of modern languages at Brown, where he remained for seven years. From 1860 to 1866 he was editor of the Providence *Daily Journal,* and then became president of the University of Vermont. Five years later he accepted the presidency of the University of Michigan, and continued in this position for 38 years, becoming president emeritus in 1909. During his long term of service President Angell broadened and developed the work of this institution, and put it into the front rank of American universities, winning for himself meanwhile a foremost place among the educators of the country.

Dr. Angell has also rendered important service as diplomat. In 1880-81 he was sent to China to negotiate a treaty; in 1887 he was a member of the Anglo-American Commission on Canadian Fisheries; in 1896 he was chairman of the Canadian-American Deep Waterways Commission; and in 1897 he was United States minister to Turkey. Dr. Angell was a man of great executive and diplomatic ability, broad culture and kindly spirit. He was the author of *Manual of French Literature, Progress of International Law, Reminiscences,* and many contributions to leading periodicals.

Angelus, *An' je lus,* a prayer said by Roman Catholics on the ringing of the angelus bell at 6 a. m., noon and 6 p. m. The prayer honors the heavenly message delivered by the archangel Gabriel, that Mary was the Mother of God. The name comes from the opening words of the prayer, "Angelus Domini nuntiavit Mariæ" (The Angel of the Lord declared unto Mary).

Modern interest in the Angelus is associated with the painting, "The Angelus," made by the French painter, J. F. Millet, in 1859. This picture portrays a harvest field where the working peasants

have stopped for a moment of prayer, as the bell in the distant church rings out the angelus.

The picture originally sold for $100.00, but so rapidly did it rise in public esteem that in 1890 it was purchased for $150,000 and presented to the Louvre.

Although not considered by critics as one of the artist's greatest pictures, it has depth of feeling which goes far toward accounting for its popularity.

Angiosperm, *An' ji o sperm,* the name of the higher division of the two great classes of seed-producing plants. The plants of this division are distinguished from those of the lower division, gymnosperm, in having their seeds incased in a capsule, or case. The angiosperms are herbs or woody plants of extremely varied forms and having parallel- or netted-veined leaves. The typical flower of this division has its parts in whorls; a calyx and a corolla, the leaflike and colored portions; the stamens, containing the fertilizing dust; and the pistil, containing the undeveloped seeds. The flowers, however, may lack one or more of these parts. The angiosperm is by far the larger of the two divisions, for the most of our ordinary flowering plants belong to this class. The rose is a typical angiosperm. See GYMNOSPERM.

Angler, or **Frogfish,** a peculiar fish of the Fishing Frog Family. Its peculiarity consists in a curved, elongated spine with a fleshy tip which proceeds from the first ray of the dorsal fin and hangs in front of the mouth. From this it receives its name angler, for the fleshy tip is said to be attractive bait to smaller fish, which, seeing it, approach near the angler's strong, wide jaws. Whether or not this is truly the object of the appendage is, however, a debatable question. The angler has a depressed body, a relatively large head and a slender tail. The skin is scaleless but often covered with warty protuberances and bearing fleshy streamers. The great angler is found in shallow water along American and European coasts as far south as the Carolinas and the Mediterranean Sea; it attains a length of three feet. Probably no fish has been given a greater number of local names; the most common of these are: allmouth, kettleman, bellowsfish, monkfish, goosefish, sea devil and fishing frog.

Angleworm. See EARTHWORM.

An'glican Commun'ion, a body of churches which hold practically the same faith, order and worship as the Church of England, which is frequently called the Anglican Church. These churches include the Church of Ireland, the Scottish Episcopal Church, the churches in the various British colonies, the Protestant Episcopal Church in the United States and a few kindred organizations. At certain intervals, on invitation of the Archbishop of Canterbury, the churches of the Anglican Communion meet in a conference at Lambeth Palace, London. See ENGLAND, CHURCH OF; EPISCOPALIANS.

An'glin, Margaret Mary (1876-), a famous actress, born in Ottawa, Canada. She first appeared in New York in *Shenandoah,* about 1895, and the following year she became leading lady with James O'Neill. Subsequently as Lady Ursula, in the Sothern company, she achieved considerable notice, and in 1898 with Mansfield, in *Cyrano de Bergerac,* and later with Frohman, her genius became evident, while her recent work in *The Great Divide* was remarkably successful. Later she toured Australia. She has produced *The Awakening of Helena Richie* and, at the Greek Theater in Berkeley, Cal., *Antigone.*

Anglo-Saxon, the name given to the Angles, Saxons and Jutes who invaded Britain in the fifth and sixth centuries A. D. They came from the land near the mouths of the Elbe and the Weser. Led by their chiefs, Hengist and Horsa, they are said to have reached England in 449. The Jutes settled Kent, the Saxons occupied the middle ground and the Angles the northern part. The towns founded by the Angles rose first to prominence, and thus the country was called Engleland, or land of the Angles.

The Angles had three classes of society: the nobles, the small landholders

and the slaves. A peculiar custom was the wergild, or life price, whereby a sum of money was exacted for injury done to anyone, from the king to the slave, varying according to his rank. This was an attempt to settle feuds without bloodshed. In government the king was a chief among equals. He was elected and maintained king solely by the consent and support of the nobles.

Agriculture and the raising of cattle were the chief occupations. The Angles were noted for their overindulgence in eating and drinking. Their houses were rude, uncomfortable dwellings even in later days, but they were often hung with rich tapestry. St. Augustine was sent to them by Pope Gregory toward the end of the sixth century and thus they came in touch with the higher civilization of the Continent. See AUGUSTINE, SAINT.

Anglo-Saxon Chronicle, the earliest English history written in the native tongue. The *Chronicle* is believed to have been undertaken at the suggestion of King Alfred and to have been written in part by him. The probable date of its origin is 892, and it forms a continuous record of events from the beginning of the Christian Era in England to the year 1154. The *Chronicle* is in the form of a book of annals and the first entries are meager and uninteresting. Later they are given in more detail, but there is nowhere any attempt to show cause and effect. The *Chronicle* was the model for the historical writing of its time, and is valuable as a trustworthy source of information concerning the period which it covers. It also kept alive the written form of the native tongue, for, during the century and a half following the Norman Conquest, Old English with this exception lived only on the lips of the conquered race. The original form of this work is not extant, but several copies of it have come down to us.

Ango'la, a Portuguese possession of West Africa bordering on the Atlantic Ocean and lying between Congo and German Southwest Africa. Eastward it extends to Rhodesia. The country is low and swampy near the coast, but farther inland has a series of low mountain chains. The climate is, in general, tropical, and the vegetation is luxuriant. The natives are a fierce, uncivilized people of the Negro race. They meet the Portuguese settlers to trade ivory, rubber, coffee and cotton for manufactured goods. In 1911 an outbreak occurred which was with difficulty subdued. The Portuguese have built many fortifications and commercial posts. Loanda is the capital. Population, 4,119,000.

Anhin'ga, a bird of the Darter Family. The anhinga, also known as darter, water turkey and snake bird, measures nearly three feet in length, of which the neck and tail make up the greater portion. In the spring the male is a glossy greenish-black, with fine spots of gray on the shoulders and the base of the wings, which are also crossed by a wide, gray band. The back is striped with pearl-gray, the tail is tipped with brown and the neck is adorned with long, whitish filaments, the back of the neck having a hairlike mane. The color of the female is similar, but the head, neck, throat and breast are brown or buff. The nest is very large and compact, is made of sticks and is placed in trees and bushes from 3 to 20 ft. above the water. The eggs are blue is color and are hatched at intervals, the young varying in size and age.

Aniline, *An'i lin,* a colorless, poisonous liquid, having a peculiar odor and used commercially in the manufacture of dyes. It was first produced from indigo in 1826; later from the distillation of the lighter oils produced from coal tar; in 1842 it was prepared from benzene; but it was not until a year or so later that these three products were known to be the same. In 1856, in experimenting to find an artificial means of producing quinine, Perkin tried the effect of iron upon aniline and produced the first coal-tar dye, a violet coloring matter, which he called mauve. This was the beginning of the use of aniline in the manufacture of dyes.

Animal Worship, the term applied to the worship of animals, a phase of religion almost universal in the earliest stages of the development of all races, and still prevalent in some of the religions of the Far East. Various motives underly animal worship, including fear, leading to propitiatory forms of worship; wonder, leading to reverence; and the doctrine of transmigration of souls, connecting animal worship with ancestor worship. Nearly every animal has been the object of worship, notably the elephant, the cow, the bull, the ram, the cat and the serpent.

Anise, *An' is,* an aromatic herb of the Parsley Family long cultivated in Egypt for the seed, which is used as a spice. It is an annual plant, growing from one to three feet in height and having many slender branches. The flowers are yellowish-white and grow in large, loose clusters, but the separate flowerets are small. There are always five petals and five stamens. The leaves are deeply lobed, and are generally made up of three leaflets. The seed is flattened and oblong. From it is produced the oil of anise, an aromatic, sweet-tasting oil, which gives the spicy taste to the entire plant. Two varieties of anise are natives of England and are also found growing wild on rocky hillsides of the Atlantic States. They are also sometimes cultivated as garden plants. Oil of anise is a constituent of some medicines.

Star anise is a tree of the Magnolia Family, which derives its name from the fact that the 20 to 30 seed pods extend like rays from a central point. It is a small, evergreen tree with long leaves. It has the distinct anise flavor of the herb spoken of above, in all its parts—leaves, stems and fruit. This tree is a native of China, where it is cultivated extensively as a producer of the spice. A wild anise-tree, having large, dark purple flowers with many petals, grows in Florida and, to some extent, in the other Gulf States.

Annam′, a division of French Indo-China, embracing the greater part of the east coast of Indo-China, as it stretches from Cochin China on the south to Tongkin on the north. The total area is about 52,110 sq. m. and the coast line has a length of 750 m. A mountain range traversing the country throughout its entire length culminates in the peak of Pusan, at an elevation of approximately 9000 ft. West of this system is the Mekong River basin, the Mekong River forming a boundary between Annam and Siam. The capital of Annam is Hué, the largest city in the division. The principal products are coffee, tea, tobacco, cotton, cereals, cinnamon and sugar cane. Valuable lumber products are obtained from the forests and large game abounds in the wilds. The chief imports are Chinese paper, machinery, metals, Chinese drugs, tea and petroleum. In government the country is a monarchy, with a king assisted by a council of six members; however, it is subject to the French resident superior at Hué, who exercises control through his staff of assistants and the military guard. The population numbers over 7,000,000, of which only a small part (4000 Chinese and 250 Europeans) are foreign-born. The natives possess strains of Aryan blood, and in the various expressions of their civilization bear a close resemblance to the Chinese. It became a field of French influence as early as 1789, and by a treaty ratified at Hué in 1884 a French protectorate was established over Annam.

Annapolis Convention, a convention held at Annapolis, Md., Sept. 11, 1786, to consider the question of commerce in the colonies and discuss proposed changes in the Articles of Confederation. Five states were represented by commissioners, Virginia, Delaware, Pennsylvania, New York and New Jersey, though Massachusetts, New Hampshire, North Carolina and Rhode Island had appointed delegates who did not attend. As sufficient representatives were not present to warrant decisive action, Alexander Hamilton proposed a resolution that a new convention of delegates meet to "make the Constitution of the Federal Government adequate to the exigencies of the Union." This led to the Constitutional

Convention, the most important in the history of the United States, which met the year following in Philadelphia.

Annapolis, Md., the capital of Maryland, county seat of Anne Arundel Co. and a port of entry. It is about 26 m. by rail s.e. of Baltimore and 30 m. direct from Washington, D. C., on the Severn River, about 2 m. from the entrance of Chesapeake Bay. Railroads entering the city are the Annapolis, Washington & Baltimore, the Baltimore & Annapolis Short Line and others. The city has steamboat communication with Baltimore and other points on the bay. It is in a region well adapted to the cultivation of fruits and berries and has a marine railway, a glass factory and an extensive oyster-packing plant. The city is best known as the seat of the United States Naval Academy, founded in 1845. It also contains St. John's College, which was founded in 1789, and in 1907 made a part of the University of Maryland. Other prominent features of the city are a fine state house, treasury building, county buildings, statues of Chief Justice Taney and General DeKalb, a convent, St. Anne's Protestant Episcopal Church, the governor's and numerous other handsome residences.

The place, which was named Annapolis in 1694 (in which year it became the seat of government), was settled in 1649, and first called Providence, later being known by several successive names. The present name was adopted in honor of Princess (afterwards Queen) Anne. It was incorporated as a city in 1708. Here, on Dec. 23, 1783, General Washington surrendered his commission as commander-in-chief of the Continental army, and here, in 1786, was held the convention which led to the Constitutional Convention. Population in 1920, U. S. Census, 11,214.

Ann Arbor, Mich., a city and the county seat of Washtenaw Co., 38 m. w. of Detroit, on the Huron River and on the Michigan Central, the Ann Arbor, the Detroit, the Ypsilanti & Ann Arbor and other railroads. The town is beautifully situated, being surrounded by picturesque scenery. It is in the midst of a productive fruit-growing district and is an important business center and shipping point. It has large manufactories of farming tools, pottery, organs, pianos, pumps, boilers, engines, wagons, flour and lumber products. Ann Arbor is chiefly distinguished as the seat of the University of Michigan, founded in 1837. It is an attractive residential city and has some handsome buildings, among them a high school building, a courthouse, post-office building, a fine depot and the Homeopathic Hospital. Electric traction lines connect the city with Detroit, Battle Creek, Kalamazoo and Jackson. Settled in 1824, Ann Arbor was incorporated as a city in 1851 and is administered under a revised charter of 1895. Population in 1920, 19,516. See MICHIGAN, UNIVERSITY OF.

Annat'to, or **Arnat'to,** a vegetable coloring matter derived from the seed of a South American tree. The seeds are crushed and allowed to ferment in water. After about two weeks this liquid is strained and set to clear. The sediment is baked into cakes which are wrapped in leaves or rushes. These cakes are insoluble in water, but may be dissolved in alcohol or fixed oils. Annatto is used in coloring silk, cotton, and woolen goods, but the colors, though beautiful, are not permanent. Its chief use is in coloring butter and cheese. The South Americans make a paint from it to protect the skin from the bites of insects.

Anne (1665-1714), Queen of England, was the last sovereign of the House of Stuart. She was the second daughter of James II, then Duke of York. Her mother died when she was seven years old. She was educated according to the beliefs of the Church of England, and at the age of 18 married Prince George, brother of the King of Denmark. She became Queen of England in 1702, upon the death of William III, and reigned until her death in 1714. During her reign occurred the War of the Spanish Succession, in which England acquired Gibraltar in 1704. During her reign also the legislative union of England and

Scotland under the name Great Britain was consummated. Her reign was noteworthy for the number of brilliant writers who flourished, among whom were Pope, Swift, Addison, Dryden and Sir Isaac Newton. She was succeeded on the throne by George I, of the House of Hanover.

Anneal'ing, a process by which metals and glass are subjected to heat in order to lessen their liability to fracture under sudden stress. The article is usually heated until it approaches softness, after which it is allowed to cool very slowly. Annealing is the opposite of tempering and is employed for the purpose of softening and toughening, so as to render the articles less brittle. See TEMPERING.

Anniston, Ala., a city and the county seat of Calhoun Co., about 63 m. n. e. of Birmingham, on the Louisville & Nashville, the Southern and other railroads. The city is in a rich coal and iron belt and is an important manufacturing city, the iron, steel and cotton interests being of chief importance. There are valuable timber tracts in the vicinity, and the lumber business is considerable. In the city and vicinity are numerous furnaces, several foundries and machine shops, also car-repair shops, rolling mills, locomotive and boiler works, several plants connected with the cotton and lumber industries, brick and tile works, carriage factories and lime works. The city has the largest tonnage of cast-iron pipe of any city in the United States. Situated as it is among the mountains of the Blue Ridge, Anniston is an attractive health resort. It contains a number of fine structures, notable among which are St. Michael's and All Angels' churches and the Parker Memorial. The leading educational institutions are the Anniston College for Young Ladies; Noble Institute, established in 1886 by Samuel Noble; the Alabama Presbyterian College for Men; and Barber Memorial Seminary, for negro girls. Anniston was founded in 1873 by the Woodstock Iron Co. and ten years later was opened for public settlement. It was chartered as a city in 1879. Population in 1920, 17,734.

Annu'ity, a sum of money paid yearly for a specified period, or until the death of a designated beneficiary, or beneficiaries, or under a perpetual contract. In some countries the government itself conducts such business. Commonly it is a private enterprise carried on by companies which, because they handle very large sums, can reduce the expenses of management to a minimum. If an annuity is to be perpetual, its amount is necessarily determined by the probable sum available annually from the investment of that consideration paid by the purchaser, less the expenses of management, for the purchase price itself must be kept intact.

If the annuity is for a definite term of years, or until the death of beneficiaries whose probable length of life is determined by accepted mortality tables, then the total to be paid in annuities, plus the expenses of management, cannot exceed the consideration paid by the purchaser, all of which ultimately goes to the beneficiary, plus a considerable proportion of the compound interest obtainable by the continuous investment of this gradually decreasing sum, at interest rates low enough to exempt the company from any legitimate charge of rashness.

Annunzio, *Dah noon'dze o,* **Gabriele d'** (1863-), an Italian novelist and poet, born near Pescara. He studied in Tuscany, and at the age of 15 published a collection of verse distinguished for its poetical beauty and grace. His later work showed a decided influence of Maupassant, Bourget and Tolstoi, and while its beauty and novelty pleased many readers, others were startled by its daring sensuousness and bold realism. He wrote novels and short stories and for a time did journalistic work, contributing brilliant articles to the *Tribuna.* In drama he attempted to reinstate something of the grandeur of the old Greek tragedy, and he drew freely on the glory of Italian history and tradition for inspiration and material. His style is characterized by wealth of language as well as beauty;

his analyses are searching and direct. In Italy he is ranked with Carducci. Among his writings are *The Child of Pleasure, The Intruder, The Triumph of Death, Flame of Life, La Giaconda* and *Francesca da Rimini.*

The World War brought into relief the more energetic side of his personality. Entering the Italian Army, he became a noted aviator and guided his airplane over Vienna itself, dropping on the city,—not bombs, but propaganda literature. In 1919, the poet-aviator enacted still another role. At the head of a volunteer force,—in defiance of the Allied Council at Paris, against the express commands of his own government,—he took forceful possessions of Fiume for Italy.

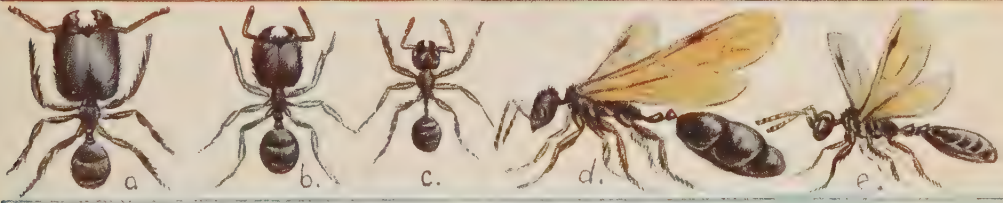
An'selm, Saint (1033-1109), a church father and philosopher, born at Aosta in Piedmont. At the age of 27 he went to Bec, Normandy, to study under Lanfranc in the monastery there. In 1063 he became prior, and in 1078, abbot of that monastery, which was the most famous school of that century. Some time before this Lanfranc had gone to England, where he became Archbishop of Canterbury. In 1089 Lanfranc died, and the diocese was vacant for four years, after which Anselm was appointed. Anselm was a distinguished Churchman and philosopher and a man of strong convictions, and his writings made an epoch in Christian philosophy. In 1720 Clement XI placed him on the list of Church authorities.

Ansonia, Conn., a city of New Haven Co., 12 m. n. w. of New Haven, on the Naugatuck River, 2 m. from its junction with the Housatonic, and on the Naugatuck and Berkshire divisions of the New York, New Haven & Hartford Railroad. The city is noted as a manufacturing center and has extensive manufactories of heavy machinery, rolls for wheat milling and paper making, electrical appliances, copper and brass goods, clocks and clock equipments, rubber, woolen and wire goods and lumber products. Ansonia was founded by Anson G. Phelps, and a public library built by his granddaughter, Caroline Phelps Stokes, is a noteworthy feature of the city. The town was set off from Derby in 1889 and chartered as a city in 1893. Population in 1920, 17,643.

Ant, a group of insects familiar in all parts of the world and of general interest because of their numbers and of their ceaseless activity, which renders them always noticeable. To watch a single ant hill with its teeming life and its continual stir of labor gives one some idea, though only a slight one, of the work that is being carried on by these little neighbors of man. Who directs this throng of busy workers? What power impels them to labor so constantly? What is the work that they carry on beneath the ground and beyond the sight of curious eyes? Do they bring intelligence as well as skill to their tasks? One ant may be seen bringing from the nest a pebble whose weight is far greater than its own; another is dragging in the body of a grasshopper, a giant indeed to its captor. Happily, many accurate observers have been interested in the ways of these little creatures and have studied them so closely that the most of the questions that would arise about them may be answered.

Classification. The ant belongs to the same group as the bees and wasps, scientifically known as the Hymenoptera and popularly known as the social insects, because they have worked out a system of government in which there is a division of labor so that each one works, not for itself alone but for the good of the community. Though there are many classes of ants, all are included in one big family, which, however, is by some divided into from three to five subfamilies.

Castes. In all species there are three classes of individuals: the males, the females or queens, and the workers. The males and the queens are generally winged, and upon them depends the perpetuation of the race. After mating, the males die and the queens pull off their wings and settle down to a quiet home-keeping life far different from their



ANTS

On the March
Eggs
Larvæ
Pupæ
Crossing a Stream

Ant Hills

Ant War
Honey Ants
Ants and Plant Lice
Carrying Leaves

a. Soldier; b. c. Workers; d. Winged Female; e. Male

hitherto care-free existence. For this reason winged individuals are seldom seen in the nest. The workers are the busy members of the colony; it was surely these that Solomon advised man to study, for they are the ones that "provide meat in the summer and gather food in the harvest." They are degenerate females and lack the power of reproduction but are highly endowed with brain power and mechanical skill. Among them are three classes: the major workers, the minor workers and the soldiers. The first two differ mainly in size; the soldiers may be distinguished by their huge heads and their formidable jaws. They may be most frequently seen evidently guarding the nest and defending it against the attack of other ants or of hostile insects of other sorts.

Nests. The homes of the ants differ greatly according to the kind of ant and the country in which it lives. Those most commonly seen in temperate climates are the small hills with the crater-like tops of sand, in the center of which is the opening to the nest. Could the eye follow the ant through the doorway to its home there would be seen numerous galleries on different levels, all tunneled out with care and skill and all adapted to some particular purpose. In one chamber lie the helpless larvæ, whose life depends upon the faithful care of their watchful nurses, the workers. In another is the seed of grass that has been stored away for winter consumption; in still another lie the unhatched eggs, a mass of yellowish objects adhering in tiny clusters; farther down in a cool storeroom are the pieces of cut-up insects that have been brought in for food, and deep or near the surface, according to the warmth of the air, are the naked or silk-covered cocoons nearly ready to hatch into adults. Many ants, however, build their nest above ground, making them of twigs, pine needles, grasses or from collections of all three. Some of these mounds, especially in the tropics, become huge hills from 3 to 12 ft. in height and capable of sheltering a half a million inhabitants. Still other ants swing their nests from the trees as do the wasps, building them from leaves sewed together by the most curious needle in the world. Acting together, several of the ants hold the edges of the leaves in place, while others lift the silk-spinning larvæ and sew the leaves tightly together by means of the new spun silk. The carpenter ants build their nests in wood and hollow out cavities with great skill; like them too are those which make use of a decaying stump for their abode.

A nest must not be confused with an ant community, for the two differ in the same way as do a single house and a city. The community is a collection of hills occupied by members of one tribe and all working together in collecting food, providing a common defense and promoting the general welfare. It is estimated that one community may number anywhere from 5000 to 500,000 inhabitants, and when one considers the number of these communities and that they are common all over the world from Arctic regions to tropics, it is not surprising that the ants are said to be the most numerous of insects.

Habits. Before the time of swarming, the males and queens are the aristocratic members of the community. They are cleaned and fed by the workers, and their heaviest labor is a mock battle or a game of tag at the doorway. After the mating, which is preceded by a period of great excitement in the community and is comparable to the swarming of the bees, the male ants die and the queens, of which there may be several in a nest, pull off their wings and begin the duties of egg laying. From this time on they never leave the nest. The real duties of the nest then devolve upon the workers. They tunnel out the chambers for the reception of the eggs and larvæ; to do this heavy pebbles must be carried to the surface and placed far from the door. It has been said that an ant can carry a burden from six to ten times its own weight for a distance over 300 times it own length, and that up a steep incline, and over many obstacles.

To compete with this a man of ordinary size would have to carry a weight of 1000 lb. up a stairway one-tenth of a mile in length, a task rather greater than the ordinary man would care to undertake. Ants are the most cleanly of insects and are constantly brushing themselves and each other with their useful antennæ, taking great pains to remove all refuse from their nests before it is allowed to collect. Overturning a loosely buried stone on a warm morning of early spring, one is apt to stumble upon a day nursery, where the workers have brought the pale babies to give them the benefit of the heat absorbed by the stone. The movement of the shelter will immediately bring the nurses to the assistance of their charges, and before one can scarcely realize what has happened, the charges are carried away beyond the sight of prying eyes.

But ants are not always peaceful in their pursuits. A leader may organize his army to defend the nest from marauding bands or lead them forth to make war upon neighboring communities, whose well-stored nests are a temptation too great to overcome. Ordinarily, however, ants are not particularly warlike in their habits. They are affectionate to members of their own household, helpful to the disabled or weary and evidently intelligent in their ways of accomplishing their purposes. They have been known to bridge a stream by forming a living rope that stretches from bank to bank and is a safe and sure passageway for the remaining company. In constructing such a bridge a leader grasps a convenient reed or grass at the bank; another seizes the abdomen of the first with its antennæ; another crawls over his companions' bodies and becomes the third link, swinging perilously close to the water; another and another quickly adds its body to the chain until the stream is spanned and the great company passes across in safety. There is, however, often a loss of life to many of the gallant bridge builders who were unable to make the crossing themselves after their duties were done. Some authorities claim certain species tunnel beneath streams, build dams to protect their dwellings and conceal their homes by means of leaves and twigs. Yet these are only a few among the many instances that might be given of the ways in which ants solve their problems of engineering, household economy and civic improvement.

Food. The food of ants consists of insects, seeds and the sweet sap of trees; their means of providing all of these is interesting in the extreme. A wounded insect much larger than the ant itself is the lawful prey of the industrious creature; a group of the workers surrounds the disabled giant and proceeds to finish the work that some other enemy had begun. The helpless insect is unable to protect itself against an enemy that is everywhere at once and soon succumbs. It is then at once cut into small pieces that may be easily taken into the nest, where it is stored away in a cool underground larder to be used as needed. The seeds are collected from the grasses that grow near, and ants often wear plainly marked paths to the places where these grains are plentiful.

But the favorite food of the common ant is one that is secured in a way strikingly human. On a rosebush that is not too carefully tended, a colony of aphids is apt to have taken up its abode, and before long its feeding ground is discovered by the active little red ants. To the ants, these aphids are as great a prize as wild cattle upon the plains are to the ranchman. In and out among the busily-feeding aphids the ants go, stroking them with their antennæ until from the body of each exudes a drop of sweet liquid known as honeydew; this the ant stores in its crop and then passes on to repeat the operation until the crop is full, when it returns to its nest and by a process of regurgitation brings the honeydew from its crop to the "children." But such intelligent little creatures as the ants are far too wise to leave such valuable food-producers as the aphids, or "ant's cows," to be the prey of any alien tribes that might find them, so before long, by some means or another, a herd is domesticated

to live in or near the ant nests. Here they are fed, tended and "milked" with as great care as the dairy farmer gives to his herds. If the colony of aphids is found upon the ground, covered sheds of earth are built about and over them, and they are thus effectually corralled. Their eggs are as well cared for as are those of the ants themselves, and the hatching larvæ are as anxiously watched. Thus the aphids, noxious indeed to the horticulturist, are viewed with far different eyes by these little inhabitants of an underground world.

CLASSES. But the common red ants known in all temperate climates are not the only ones whose habits resemble man's. To the different species whose occupations are much like our own, names have been given that give us a hint of the work they do.

Harvester, or Agricultural, Ants. The agricultural ants of Texas are especially noted for their work as farmers, for, although they do not, as was once supposed, plant the grain from which they wish to collect the seed, yet they do dig their nests near places where this grain grows and carefully remove all other vegetation from their "fields," so that they thus prove themselves careful cultivators of the grain. At the time of harvest they collect the grain so well that not a seed is wasted, and that too is stored in underground cells that are this time granaries. Because they have been seen to remove sprouting seeds and bury them it was once supposed that they also planted the seed for a new crop, but the sprouted seed, not being good to eat, is waste material and is treated the same as any other refuse. In fact the grain as it is brought to their granaries is treated with formic acid to prevent its growth; so the knowledge of planting the crop cannot be put to their credit.

Slave Makers. These are a race of North American ants which make war upon other communities, taking prisoner any of their enemy so unfortunate as to fall into their hands. These, and often the larvæ as well, they take back to their own nests where they compel them to act as slaves. Strange as it may seem, these captives never rebel, but dig the tunnels, care for the larvæ and provide the food for their masters as faithfully as they did for themselves alone. This docility often leads to the natural result that the masters lose not only the ability to labor but also the ability to govern, and it occasionally happens that by gradually assuming one responsibility after another the slaves become the masters, while the larger and once stronger race becomes a helpless band, living in a semi-invalid state upon the charity of their former slaves.

Driver Ants. The drivers are a peculiarly restless race of the Southwest. They seldom remain long in one nest, but start out upon long pillaging and marauding expeditions led by a gallant drum-major and preceded by active scouts. Their object is the booty that they find in the well-stored nests of less nomadic tribes.

Honey Ants. These ants are found in the West notably in the Garden of the Gods. They are peculiar chiefly from the fact that one group of their workers has specially formed abdomens, which they use as storage vats for honey. These specialized workers hang from the ceilings and about the walls of their galleries, while other workers go out to gather from oak galls the honey, which they bring home and store in the living "honey jars." When full, the abdomen is stretched until its walls are almost transparent and show the yellow liquid within. From them the honey is obtained at will by the workers, which stroke the heads of the "honey jars" until a drop of the liquid collects and is eagerly lapped up by the hungry laborer.

Other Classes. There are so many species of ants with so many interesting habits that all cannot be discussed. Some of these are the thief ants, tiny creatures which live in the walls of the larger ants' nests as mice live in the walls of houses; the umbrella ants, which cut leaves and carry them over their backs like umbrellas as they travel to and fro in the sun; the shed builders, which build

mud walls over any food that they find; the leaf cutters, which cut leaves, roll them in balls and allow a fungus to grow therein, that is as great a dainty to them as mushrooms to the epicure; and the carpenter ants, which saw their galleries out of wood. These and many others equally interesting may be read of in the books of those writers who have taken the time to enjoy the curious habits of these strikingly intelligent creatures.

STRUCTURE. Ants are among the most easily recognized of insects. Their bodies are smooth, almost as though glazed, and are plainly divided into head, thorax and abdomen. The first segment of the abdomen is a tiny button, which allows so great flexibility of the body that the abdomen can be bent underneath the thorax and almost parallel with it. The workers are somewhat larger than the males and females, have more rounding abdomens and longer thoraxes. The antennæ are also longer and stouter.

Like the flies they have both compound and simple eyes and a keen sense of smell; whether or not ants have a sense of hearing is still debated, although some authorities believe they have a range of hearing that differs widely from ours. Some ants are armed with sharp stings, some with powerful jaws and some with a poisonous, or at least an irritating, acid as defense against a foe or a weapon to secure their prey. The larvæ are creamy-colored, crescent-shaped objects, footless and helpless and depending for their lives upon the care of their nurses. In the third, or pupal, state, they may or may not spin cocoons. Those which do thus wrap themselves, do it so well that were they not extricated at the proper moment their lives would end before fairly begun. Ants are longer-lived than bees or wasps. The egg matures in from 15 to 40 days, the larvæ in from 40 to 100 days; and the pupal, or resting, stage is of 21 to 28 days' length. The adult male ordinarily lives but one season; the worker two or three years; and females have been known to live over ten years.

Many interesting books have been written upon ants. One, *The Prince and His Ants,* by an Italian author, Luigi Bertelli, has been recently translated into English and is a charming story for children, which older people would do well to read and would, no doubt, find helpful and interesting. Others which are a little more pretentious but very entertaining are: Wheeler, *Ants;* McCook, *Ant Communities;* Lubbock, *Ants, Bees and Wasps.*

Antæus, *An te' us,* a Libyan ruler, the son of Neptune and Terra. He was a famed wrestler of gigantic stature, who forced all strangers to a contest of skill. Defeat, which happened to all, meant punishment by death. Hercules, however, knowing Antæus to be invincible just so long as he was in contact with his mother Earth, lifted him into the air, where he squeezed him to death.

Antarctic Region, that part of the earth's surface which surrounds the South Pole. It may be said to be bounded by the Antarctic Circle, though its boundaries are better defined by the limits of the drift ice, which shift from 60° to 45° south. On the north it is continuous with the Atlantic, Pacific and Indian oceans. The total area of the region is about 8,200,000 sq. m. The region has not been so thoroughly explored as the North Polar areas, the period of exploration extending over only 140 years. In recent years the most noteworthy expeditions have been conducted by the Englishmen, Scott and Shackleton, and the Norwegian, Roald Amundsen, the last of whom discovered the South Pole Dec. 17, 1911.

Unlike the region about the North Pole, the South Polar region consists chiefly of land, a continent nearly 3,000,000 sq. m. in extent, or about the size of the Continent of Australia, lying in its center. This body of land is traversed by a lofty range of mountains varying in height from 2000 to 15,000 ft., and is indented on one side by a deep inlet known as Ross Bay, whose shores are marked by high walls of floating ice, known to explorers as the "barrier," and

constituting a factor in physical geography which occurs nowhere else on the globe. Instead of being flat, as the early geographers believed, the earth bulges at the South Pole to a height of 10,500 ft. above the sea level. The geological formation has not been fully determined, though granite, gneiss, mica schist, sandstone, basalt, diorite and coal have been discovered, also fossil wood and shells of Mollusks. Amundsen reported a mean annual temperature of 14.8° below zero F.; during the winter, which lasts from April 22 to August 24, the temperature was from 58° to 76° below zero F.; in the spring, which began about the middle of October, the temperature was 4° to 22° below zero F. On the Antarctic Continent there are absolutely no forms of animal or vegetable life, though certain species of sea birds, including the penquin, gull, plover, teal, petrel, albatross, skua and tern, breed during a few weeks in summer at certain localities on the coast.

The Antarctic Ocean varies in depth from 500 to 4000 fathoms, and its temperature in the deepest water ranges from 32° to 35° F. There are two great Antarctic currents, one of which, moving north, crosses the Antarctic Circle between longitude 120° and longitude 140° west. Near latitude 50° it swerves eastward, separating at Cape Horn, part flowing northward past Peru, and part continuing eastward to longitude 60° east, where it returns poleward. The other current crosses the Antarctic Circle moving northward, between longitude 80° and 100° east, and swerving to the eastward forms the west Australian current. Not until all the records of the several later explorers can have been brought together and compared by scientific bodies can a more complete and accurate account of the geological, meteorological and other aspects of this region be given. See POLAR EXPLORATIONS.

Ant'eater, a name applied to several species of South American Mammals, grouped together in the Anteater Family. The great anteater, which is typical of the family, lives east of the Andes but is not found in any great numbers. It is a long animal whose length is accentuated by its narrow, sloping head that tapers to a pointed snout. The mouth is scarcely more than an opening for the thrusting out of the long, sticky tongue. The eyes and ears are small and the whole face has an appearance of stupidity which the actions of the animal do not belie. Its body is shaggy and of gray-brown color, and has a white-bordered, black band upon each shoulder.

GREAT ANTEATER

The legs of the anteater are stout, and the forefeet have long claws turned in, so that the animal walks upon its knuckles. Its tail is extremely long and has long hair which continually sweeps the ground and is an ample covering from the rain and hot sun. In habits the anteater is slow and solitary, spending a great deal of time in sleep. Its food consists of the innumerable ants and other small insects which infest South America; these are uncovered by its huge claws and are licked up by its sticky tongue. The little anteater has short, shiny hair and lives chiefly in trees, as does also its relative, the two-toed, squirrel-like anteater. The aard-vark, once classed in the Anteater Family, has recently been placed in a distinct group. See AARD-VARK.

An'telope, a name applied to a number of handsome, graceful animals of the Bovine Family, found wild in Europe, Asia and Africa. They resemble the deer in many ways, but the round, hol-

low horns, which are often worn by both sexes of the antelope, are permanent. There are two classes of antelopes: the first are small, gazellelike animals, with graceful, delicate limbs and shiny black horns; the second are larger and have stout, twisted horns. Of the latter class, many are particularly noble in appearance. The head is small and generally held in the arched position of the high-bred horse; in some cases this position is a necessity that they may keep from wounding themselves with their own sharp horns. Their long, erect ears are continually in motion and are keen to hear the slightest sound.

ANTELOPE

In speed the antelope surpasses the fleetest greyhound and it can leap over obstructions 10 or 15 ft. in height or cover over 10 or 12 yards in a single bound. They travel in large herds, having a single buck as the leader, and graze in open plains where they can lie down to ruminate. Antelopes differ greatly in color; probably the handsomest is the sable antelope, which has a black, satiny coat above but is an intense white upon the cheeks and belly. The harnessed antelope is dark with lighter stripes, a coloration which helps to conceal it in the thicket. The buck inyala is also peculiarly striped, but the female is a rich fawn color. The American antelope, better known as the pronghorn, is not an antelope but a member of the Deer Family. See PRONGHORN; ELAND.

An'thony, Daniel Read (1870-), an American congressman, born in Leavenworth, Kan., and educated at the University of Michigan. On the death of his father, in 1904, he became editor and manager of the Leavenworth *Times*, and in March, 1907, he was elected to Congress for the unexpired term of Charles Curtis, being twice reelected. Previously, from 1898 to 1902, he was postmaster of Leavenworth, and from 1903 to 1905 he was its mayor.

Anthony, Susan Brownell (1820-1906), an American reformer, born at South Adams, Mass., of Quaker ancestry. She was educated at a Friends' boarding school in Philadelphia, and taught school in New York State for 15 years. In addition to her pedagogical work, she contributed articles on literary and social topics to several magazines, and made a wide circle of friends. In 1847 she made her first public speech and thereafter gained much prominence and influence as a lecturer in behalf of temperance, the abolition of slavery and the extension of the rights of women. She helped to organize women's societies in various parts of the country for the purpose of securing for women property rights, the right of guardianship of their children and the right to vote. Through her efforts the opportunities open to women dependent upon their own resources were greatly extended. She was for many years president of the National American Woman Suffrage Association. Miss Anthony was an able platform speaker, often addressing vast audiences; a cogent writer, and a courageous pioneer in the new movement for the broader life of women.

Anthracite. See COAL.

An'thrax, a serious infectious disease common among cattle, horses, goats, swine and sheep. The germ which causes it is a large one and is very difficult to kill; for this reason when the disease once starts in a flock it is not easily exterminated. Anthrax first makes itself known by the presence of pustules upon the body of the infected animal; in the progress of the disease the body bloats and dropsy and fever ensue. At the last the animal seems to become crazy, goes into convulsions and then dies. The germ causing the disease lives in the alimentary tract or in the skin; it attacks carnivorous, or flesh-eating, animals less

commonly than grazing animals. Anthrax may be carried to man through wounds in the skin or through the lungs, and tanners and wool sorters are often subject to it, although with man it is seldom fatal.

When the disease breaks out the infected animals should be completely isolated; if they die, as they almost invariably do, their bodies should be burned. The stables and all parts of the farm where the infection is liable to have spread should be treated with disinfectant. Epidemics of anthrax often break out in sections of the country and can be prevented only with great care. Vaccination renders animals immune for a short time. The various state agricultural departments will, upon request, send helpful bulletins on the subject.

An"thropol'ogy, the study of man in his relations to the animal kingdom. As a science it attempts to determine man's place in nature and accounts for his development through evolution rather than by special creation. The investigations of geology and archæology have established, scientifically, the vast age of the human race. Anthropology accepts these claims and follows the progress of civilization from the earliest stages of barbarism to man's present level. Its units for specialized study are language, religion or ceremony worship, forms of government and social and industrial conditions.

An"ticos'ti, an island of the Province of Quebec, Canada, situated at the mouth of the St. Lawrence River. It is 135 m. long and has a maximum width of 40 m. The climate is severe, the harbors are few and the surface is alternately mountainous and swampy. The keepers of the lighthouses are the principal inhabitants. It offers opportunities for seal and bear hunting, and for salmon, cod and herring fishing.

An'tidote. See POISON.

Antietam, *An te' tam,* **Battle of,** an engagement of the Civil War, fought at Antietam Creek, near Sharpsburg, Md., Sept. 16 and 17, 1862. There 40,000 Confederates under Lee, aided by A. P. Hill, D. H. Hill, Jackson, Early, Stuart, Hood and Longstreet, were overtaken by 75,000 Federals under McClellan, aided by Hooker, Sumner, Burnside, Sedgwick and Slocum, and the struggle which ensued decided the issue of Lee's proposed invasion of the North. The fact that it compelled him to retreat into Virginia, though in reality a drawn battle, caused Lincoln to issue the Emancipation Proclamation, as he had vowed to do if Lee were defeated. Towards evening of the 17th both armies had stopped fighting as though by mutual agreement, after what was the bloodiest day in American history. The Federals lost 12,500 men; the Confederates, 11,000.

Anti-Federalist Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Anti-Federalist Party.*

An'tigo, Wis., a city and the county seat of Langlade Co., 96 m. n.w. of Oshkosh and 156 m. n.w. of Milwaukee, on the Big Eau Claire River and on the Chicago & North Western and other railways. The town is situated in a productive agricultural and timber region and is an important commercial center. It has foundries, flour mills, railroad shops, planing and saw mills and manufactories of excelsior, veneer, broom handles, chairs, sashes, doors and blinds, hubs and spokes. Settled in about 1878, Antigo was incorporated in 1884. Population in 1920, U. S. Census, 8,451.

Antigone, *An tig' o ne,* in Greek mythology, a daughter of Œdipus, the King of Thebes, by his mother, Jocasta. She is chiefly celebrated for her devotion to her father and to her brother, Polynices. After the death of Œdipus, Creon, then monarch of Thebes, forbade anyone's interring Polynices, as that young prince had been killed while waging war against his own country. Penalty for disobedience was death. Notwithstanding, Antigone sprinkled dust three times on her brother's remains, and, as this was equivalent to burial, she was seized and immured alive in a tomb, where she hanged herself. Her betrothed, Hæmon, son of Creon, killed himself on her corpse. This

story is the basis of one of Sophocles' tragedies.

Antilles, *An til' lez.* See WEST INDIES.

Anti-Masonic Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Anti-Masonic Party.*

An'timony, a brilliant, silver-white metal found in a crystalline state in Nova Scotia and Borneo and, in small quantities, in the United States. Its chief source, however, is the mineral, stibnite, a compound of sulphur and antimony, which is found in great quantities in Hungary and Japan. From this, pure antimony is obtained.

Antimony is exceedingly brittle, burns with a brilliant flame and solidifies in fernlike crystals. Its most noted characteristic, and one which it transmits to its compounds, is its great expansibility in solidifying. On account of this it is in use in the composition of type metal where fine impressions need to be taken, for as it cools it fills the molds perfectly.

Antimony is one of the oldest-known metals, having been used by the Chaldeans in manufacture, and by the women of the East as a cosmetic. The alchemists were very familiar with it, and an interesting book published in 1685 by the alchemist Basil Valentine, *The Royal Chariot of Antimony,* is still in existence.

Antioch, *An'ti ok,* the capital of the Hellenistic kings of Syria, the most magnificent of the 16 cities of that name built by Seleucus Nicator. It was happily situated near the River Orontes, on the fertile plains extending back from the left banks of the stream, and through its harbor, Seleucia, it maintained commercial communications with all the important maritime cities of the West. Caravans from the East crossed the vast Syrian desert that lay behind it, and thus the city became the center of trade between Mesopotamia, Arabia and the European countries. Renowned throughout the world for its magnificence (it was known as "Antioch the Beautiful"), it was the favorite resort of wealthy Romans and the Selucid princes, and its far-famed edifices included the Temple of Jupiter, the palace, the Senate House, the Cæsarium, the theater and the amphitheater. Antioch was the home of Paul's first ministry and the seat of ten important councils, fast following upon the confiict between Jewish and Gentile Christianity. The Persians totally destroyed the city when they invaded Syria in 538; it was conquered by the Saracens in the seventh century; 200 years later it fell into the hands of the Greeks, but came under Mohammedan power again in 1084. Besieged by the Crusaders in 1098, it was occupied by the Christians until 1268. The population has decreased from 400,000 to from 18,000 to 28,000, and only a few Christians are now found in the city. The modern town has none of the splendor or magnificence of the old "Crown of the East."

Antiope, *An ti' o pe,* the Amazonian queen carried off by Theseus in his famous expedition against her peoples. She is sometimes called Hippolyta, as in Shakespeare's *Midsummer Night's Dream.*

Antipyrine, *An"ti py'rin,* a drug often given to allay pain. It is a white crystalline powder composed of carbon, hydrogen, oxygen and nitrogen, and is soluble in water. Since it is likely to have ill effects upon the heart it should be taken only upon the advice of a physician.

Antisep'tics, substances which prevent decay by stopping the growth of the bacteria that would cause it. They differ from disinfectants in being less irritating and thus may be used upon the human body. Weak disinfectants are used as antiseptics for cleansing wounds. The most commonly used are a weak solution of carbolic acid, formaldehyde and heat. Other antiseptics used as preservatives are: alcohol, used in laboratories for preserving specimens; salt, for meats; tannic acid, for hides; creosote and charring, for wood; and freezing or cooling for many substances. The last, however, is not a thorough antiseptic, as there are few bacteria killed by freezing; the lowered temperature renders them inactive and prevents their growth but does not destroy them.

Antis'thenes (born about 444 B. C.), a disciple of Socrates, and founder of the Cynic School of philosophy in Athens. He wrote a large number of philosophical works and taught elocution and philosophy for many years. The Cynics taught that a virtuous life is the chief aim of man, but held that virtue consists in the absence of every desire. The wise man is self-sufficient, independent of everything, indifferent to all the concrete interests of life; they therefore treated these interests with contempt. This school of thought led to Stoicism.

An"titox'in, any of a number of substances formed in the blood of all animals and which neutralize the effect of the poisons caused by disease. Under ordinary conditions these antitoxins are produced spontaneously with the growth of the poison, and form a defending army to block the entrance of invading disease. If, however, the system is weakened, the invaders are frequently too strong for the antitoxins and the battleground is given over to the enemy. A person is then said to "come down" with the disease. Where a person's own system is too weak to produce antitoxins rapidly enough, injections of serum from the blood of an inoculated animal are made and act as reinforcements. A person whose system is capable of destroying the poison and carrying it away, whether of itself or by means of injections, is said to be immune. Specific antitoxins are known and used in cases of cholera, yellow fever, smallpox, diphtheria, bubonic plague, pneumonia and tuberculosis. Although they are frequently used, the composition of the antitoxins is not fully known, other than that they are complex proteid substances, easily held in solution. See VACCINATION.

Ant Lion, a family of insects of the order Neuroptera. In their adult stage the ant lions are little known, since, although they are comparatively abundant, they fly by night. They are graceful, harmless little creatures, with slender bodies, long, blunt-oval wings, which are often spotted with brown or black. The eggs are laid in the warm sand, where they hatch into exceedingly clever little hunters which lay snares for their prey. They begin by digging a circular groove, which they deepen centrally by throwing out shovelfuls of sand by means of their flat heads and strong neck muscles. Burrowing into the sand at the base of this, they leave only the powerful claws and ugly head visible. The sand, in which the pit is dug, is loose, and an ant, the chief prey of the ant lion, coming to the edge is apt to set the sand rolling and itself with it. A struggle to regain foothold only results in a greater avalanche of sand or incites its ambushed enemy to throw a shower of sand from the base of the pit, and this seals the ant's fate. The blood is sucked from the ant's body, the remains dragged away and the pit repaired in preparation for another victim.

The entire life history of the ant lion is not fully known, but from the larval stage it goes into an inactive pupal state, wrapped tightly in a doorless ball of sand. In this state it lives for many months, sometimes an entire winter, emerging as a perfect insect in the early spring. Ant lions are widely distributed in warm localities where there is plenty of sand for the larva's nest. The family consists of eight genera of several species each.

Antonel'li, Giacomo (1806-1876), an Italian cardinal, born in Italy, at Sonnino. Early in life he showed great intellectual power, and was sent to the Grand Seminary of Rome, where he became one of the most noted students. Pope Gregory XVI befriended him and appointed him to some good positions. In 1841 he became undersecretary of the ministry of the interior, and in 1845 minister of finance. In 1847 he was made cardinal by Pius IX, and became a member of the ministerial council; the following year he was made prime minister. He accompanied the Pope in his flight to the seaport of Gaeta, and after his return to power was a moving spirit in the reorganization of the government. In the Ecumenical Council which began its sittings in 1869 he was an important mem-

ber, being particularly helpful to the Pope.

Anton'ius, Marcus. See MARK ANTONY.

An"toni'nus Pius (86-161), Roman emperor. The Emperor Hadrian adopted him as his son and successor. He succeeded to the throne in 138, and found favor with his subjects by reason of his wisdom and clemency. He enlarged the Roman territory in Britain, checked the invasions of the Picts and Scots and mitigated the persecutions of the Christians.

Antony, Saint (251-356), the founder of cenobitical, that is, religious community, life, was born in Egypt of rich parentage. Following literally "If thou wilt be perfect, go, sell all thou hast and give it to the poor," he retired in 271 to the deserts of Thebaid, where he consecrated himself to prayer and fasting. After long years God gave him the gift of miracles, which won him many disciples. These gathered into communities of monks and were vowed to poverty, chastity and obedience. These communities soon spread through the entire East. Twice St. Antony returned to the busy world. On the second occasion (325), enthusiastic crowds gathered about him crying, "Let us see the man of God."

Ant'werp, the chief city of Belgium, capital of the Province of Antwerp, situated on the Schelde River, about 50 m. from the open sea. The prosperity of the city, formerly known for its "money-eyed men," is revealed chiefly by its long rows of fine houses on the broad avenues, as well as by its several imposing public edifices. A church built in the 14th century has a tower 400 ft. in height, which can be seen at a great distance. Within the church hang the noble masterpieces of Rubens, *The Descent from the Cross, The Elevation of the Cross* and *The Assumption.* Other buildings are the churches of St. James, St. Andrew and St. Paul, the Bourse, or exchange, the Maison Plantin Museum and the new picture gallery. Antwerp, celebrated formerly for its school of painting, still possesses several masterpieces by Rubens, Van Dyck, Jordaens, Titian, the two Teniers and many others.

It is the largest fortress in Belgium, and its harbor facilities are admirable, much time and money being expended on dock accommodations. The American dock, completed in 1905, admits ships drawing 30 ft. of water. Among the industries are shipbuilding, lace making, sugar refining and distilling. In 1560 the city reached the high-water mark of prosperity. The Treaty of Münster in 1648, which recognized the independence of the United Provinces, brought about a sudden check to its advancement; in 1800, however, $2,000,000 was appropriated for docks and a mole, by Napoleon, who recognized its strategic importance. Population, about 400,000.

Anu'bis, a deity of the ancient Egyptians, son of Osiris by Isis. Though possessed of great wisdom and goodness, he had the nature and head of a dog. He conducted dead souls from this world to the next.

Aorta, *A or'ta,* the largest artery in the body, which springs from the left ventricle of the heart and passes downward through the trunk. See ARTERIES.

Apa'che, the name given to a tribe of North American Indians who formerly lived in Arizona and southwestern Mexico. Some 5000 in number, they are now in the San Carlos and White Mountain reservations in Arizona, as well as in Oklahoma and New Mexico. They were a warlike tribe, and the final surrender to the whites did not take place until 1886.

Ape, a name now used to refer to members of the Simian Family of monkeys, otherwise called the manlike, or anthropoid, apes. In its broader usage the name has been applied synonymously with the word *monkey* to all Primates except man and the lemurs; popularly the name suggests only the larger species. Apes differ structurally from man in the form of skull, curve of spine and union of bones in the sacrum. Their frames are stronger and heavier; and their brains are much smaller. The great toe is opposable and acts more like the human thumb, and, therefore, the ape

may be said to be four-handed rather than four-footed.

The bodies are clothed with hair except upon the cheeks and palms, and many have a soft shorter fur. Apes live chiefly upon a vegetable diet and are able to climb with ease to seek food or shelter. All are tailless and are inhabitants of the Old World.

The chief classes are the gibbons, chimpanzees, gorillas, orang-utans. The Gibraltar ape, Barbary ape and mandrill, members of the Macaque Family, differ from the others in having cheek pouches for the temporary storage of food. See GIBBON; CHIMPANZEE; ORANG-UTAN; GORILLA; MONKEY; MANDRILL.

Apel'les, the most famous painter of ancient Greece, was born in the fourth century B. C. His birthplace is supposed to be Colophon. He formed a close friendship with Alexander the Great, whose portrait with a thunderbolt in his hand is one of Apelles' most famous paintings. His drawings were noted for their accuracy in detail and their delicate coloring, and his works exerted a strong influence upon Botticelli, Dürer and other artists of later times.

Apeninnes, The, *Ap' e ninez,* a mountain chain forming a part of the system of the Alps and extending the whole length of the Italian Peninsula. Its length is 800 m., in breadth it varies from 25 to 85 m., the average height is 4000 ft., and in the north, among the mountains of the Abruzzi, it rises to over 7000 ft. Monte Corno is the highest peak. There are 13 passes, and important river basins are formed in the west. The summits of the range are barren and sterile and the monotonous aspect of the high wall is broken only where the peaks of the Sub-Apeninnes, in the Abruzzi, rise to noble and commanding heights. The stony slopes are thinly covered with grass and scraggy bushes, with here and there dense forests and fertile pastures. Near the Gulf of Naples the vegetation becomes almost tropical in appearance and there are found orange groves, figs, agaves and myrtle bushes. Limestone, sandstone and marl are prevalent rocks, and in the Roman and Neopolitan Apeninnes is a wide variety of marble.

Aphasia, *A fa' zhi a,* a term which means, literally, inability to speak, but which is conveniently used to include several forms of disorder arising from injury to certain areas of the brain. Chief among these are sensory aphasia, including auditory and visual aphasia, and motor aphasia. Auditory aphasia arises from a lesion of the auditory centers of the brain. The patient so afflicted is unable to understand words spoken to him or other ordered arrangement of sound, as music. Visual aphasia arises from a lesion to the visual centers of the brain, which destroys visual memories. The sight is unimpaired, but things seen have no meaning for the patient, neither can he understand written language.

In motor aphasia there is a lack of coordination of the muscles and the nerves which stimulate them. This form of the affliction includes aphemia, loss of power of speech; and agraphia, loss of ability to write. In aphemia the mechanism of articulation is unimpaired, and the patient knows what he wants to say; but the vocal organs will not act. The patient understands what is said to him and also understands written language, but lacks the harmonious operation of muscle and nerve. If the disturbance is in that part of the brain where movement memories are supposed to be located, the person can repeat words immediately after hearing them spoken, but can do no independent talking for himself. Sometimes faulty memories of lip and tongue movements result in his using inappropriate words. If the injury is to the visual word centers, the patient is unable to speak if he has been in the habit of recalling a memory of the written word immediately before articulation.

Agraphia is that form of motor aphasia characterized by inability to write. It is caused by an injury to the visual speech centers of the brain. This form of aphasia is often associated with the motor vocal type. See BRAIN.

Aphid, *A'fid,* **Plant Louse** or **Green Fly,** a family of widely distributed insect pests of the order Hemiptera. There are a great number of species, all of which are tiny, green-bodied creatures, either winged or wingless, and doing great damage because of the rapidity with which they multiply. They feed upon the leaves, stems, or roots of almost all fruit trees, shrubs and ornamental plants, and, though practically defenseless, seem to defy extermination. Their life history is peculiar: a single egg which remains unhatched during the winter produces a female known as the stem mother, which, in turn, is able to produce unfertilized eggs during the entire summer. From these eggs hatch other wingless females having the same powers of reproduction. Later, in the early autumn, winged males and females are hatched which produce the winter egg.

The aphid is probably best known because of the secretion of "honeydew," a liquid which hardens as it exudes from the body and has been called the national dish of the ants, since it is eagerly sought by them. In order to secure it, ants keep colonies of the aphids, which they provide with shelter and food and whose eggs they guard as carefully as their own. Aphids may be kept in check by the use of poison sprays, kerosene emulsions, tobacco washes, white hellebore, etc. Those chiefly known as pests are the grape lice, rose lice, beet aphids, apple aphids, cherry aphids, plum aphids and woolly aphids. See INSECTICIDE; ANT.

Aphrodite, *Af"ro di' te.* See VENUS.

Apiary. See BEE.

A'pis, a sacred bull to which ancient Egyptians accorded highest veneration. His body was peculiarly marked and was regarded as the habitation of the soul of Osiris. When Apis attained the age of 25 he was drowned in a sacred fountain and another bull with sacred marks was installed in his place. The annual feast of Apis, which was celebrated with great splendor, began with the rising of the Nile and lasted seven days. The death of the sacred bull was publicly mourned.

Apocalypse, *A pok' a lips,* the name often applied to the last book of the New Testament, the *Book of Revelation.* See REVELATION, BOOK OF.

Apocalyp'tic Number, the number referred to by St. John in the *Book of Revelation,* in the last verse of the 13th chapter: "Let him that hath understanding count the number of the beast: for it is the number of a man; and his number is Six hundred threescore and six." The beast, having seven heads and ten horns, is represented as an oppressor and deceiver of mankind, and evidently stood for some Roman emperor whom the writer feared to mention by name. The number has had many interpretations, the most favored being that which finds in the corresponding letters of the Hebrew numerical alphabet the name of Nero.

Apocrypha, *A pok' ri fa,* the name given to certain sacred writings found in some editions of the Bible but not usually considered authentic. The word *apocrypha* is Greek, meaning hidden or spurious. It was used by the early Church to designate certain writings of the last two centuries preceding the Christian Era, which were not considered by Protestants to be reliable. These writings were, however, incorporated in the Vulgate, which became the basis of the Catholic Bible. The following are the names of the books of the Apocrypha: *First Esdras, Second Esdras, Tobit, Judith,* the rest of the book of *Esther, The Wisdom of Solomon, The Wisdom of Jesus, The Son of Sirach,* or *Ecclesiasticus, Baruch the Prophet, The Song of the Three Children, Susanna and the Elders, Bel and the Dragon, The Prayer of Manasses, First Book of Maccabees* and *Second Book of Maccabees.* See BIBLE.

Apol'lo, in Greek mythology the god of the sun, of archery, of prophecy, music and medicine, and the son of Jupiter and Latona. He killed the serpent, Python, and, with his sister Diana, slew the sons and daughters of Niobe. Angered at the fate of his son Æsculapius, who fell by the thunderbolt of Jove, Apollo slew the Cyclopes, the forgers of the thunderbolts. For this he was exiled from heaven,

and coming to earth he took service as a shepherd with Admetus, a king in Thessaly. At the siege of Troy he aided the Trojans. This god was a favorite object of worship among the Greeks, and in many of the temples erected to his honor his oracles gave revelation of the future. The most celebrated of these was at Delphi. The sacred animal of Apollo was the hawk; his tree, the laurel. He himself is presented as the perfection of combined manly strength and beauty; his brows are wreathed in laurel; in his hand he bears his bow or his lyre.

The wonderful statue of Apollo, in the Belvedere gallery of the Vatican, is one of the most prized remains of classic sculpture, and shows the ancient conception of this deity.

Ap'oplex"y, a malady which attacks the patient suddenly, causing loss of sensation and power of voluntary action. It is the result of pressure on the brain due to ruptured blood vessels or congestion of the blood. Its usual occurrence is in persons of from 50 to 70 years of age. In a severe attack the patient falls suddenly, breathes heavily and appears to have lost all consciousness; but the action of the heart, lungs and blood vessels is uninterrupted. The causes of apoplexy are sedentary or luxurious habits, indulgence of temper or passions, and sometimes intense continued mental effort. Preliminary symptoms are drowsiness, dizziness or vertigo, impaired hearing and vision and noises in the head.

Apostle, *A pos' sl,* **Islands,** a group of 27 islands in Lake Superior belonging to Ashland County, Wis. They are also known as the "Twelve Apostles." Their entire area is about 200 sq. m. They contain valuable quarries of sandstone and are the site of the Lapointe Indian reservation. Lapointe on Madaline Island is the only town of importance.

Apostles, in a special sense, the term applied to the Twelve by whom Christ was attended throughout his ministry. They were Andrew and his brother Simon Peter; James and John, the sons of Zebedee; James, the son of Alpheus; Jude, doubtless to be identified with Thaddeus; Simon, the Canaanite; Philip, Bartholomew, Thomas, Matthew and Judas Iscariot. Of these, all were laborers except Matthew, who was a tax collector. After the defection of Judas Iscariot, Matthias, chosen by lot, was added to the band. Paul also became an apostle, and Barnabas, a coworker with Paul, is designated as an apostle in *Acts xiv, 14.* In a wider sense the term *apostles* is applied to the early missionaries to the heathen, such as St. Augustine, apostle to the Saxons of England.

Apostles' Creed, according to tradition drawn up by the apostles themselves, is the briefest summary of the doctrine taught by the apostles, containing the 12 fundamental articles of Christian faith. These are: belief in God, the Father; in Jesus Christ, His Son; in the miraculous birth; in the suffering, crucifixion, death and burial; in the descent into hell and the resurrection; in the ascension into heaven; in Christ, the Judge; in the Holy Ghost; in the Catholic Church and the communion of saints; in the forgiveness of sins; in the resurrection; and in eternal life.

The Nicene, Chalcedonian and Athanasian creeds enlarge upon certain articles. With the Apostles' Creed they form the four great Catholic symbols or declarations of doctrine.

Ap"ostol'ic Succession, the doctrine which teaches that bishops, priests, deacons and other similar officers of the Church receive consecration from those who trace their rights, in direct line of succession, back to Christ's apostles. The Roman Catholic, Anglican and Eastern churches observe this doctrine, and consider no minister legitimate who has not been ordained by a bishop claiming this succession.

Apoth'ecary. See DRUGGIST.

Appala'chian Mountains, a mountain system occupying the eastern part of North America and extending from near the St. Lawrence River to the northern part of Alabama. The general direction of the ranges is from northeast to southwest. The extent of the system from north to south is about 1300 m., and its

widest expanse in Pennsylvania is about 100 m. The chief ranges comprising the system, in their order from north to south, are the Green Mountains in Vermont and Massachusetts, the White Mountains in New Hampshire, the Adirondacks in New York, the Alleghenies in Pennsylvania, the Blue Ridge in Virginia and North Carolina, the Cumberland in Tennessee and Black Mountains in North Carolina. Each of these ranges is described under its title.

The Appalachians are low mountains with rounded summits, and with few exceptions are covered with forests. The valleys between the ranges are long, narrow and fertile. The system is noted for its gaps or chasms, through which the Hudson, the Delaware, the Susquehanna and the Potomac rivers find an outlet to the sea.

Ap"palach"ico'la, or **Ap"alach"ico'la,** a river of Florida, formed by the junction of the Chattahoochee and the Flint. It flows southward across Florida and enters Appalachicola Bay. Its length is 100 m. and it is navigable the entire distance.

Appeal', a legal term applied to the removal of a suit from a lower to a higher court. Appeals are taken when one of the parties to the suit desires a rehearing and hopes he will secure a reversal of the decision of the lower court. Each system of courts has peculiar rules upon which appeals can be granted. In order to secure an appeal, the party must be able to present additional evidence or show a certificate of an error in the conduct of the trial before the lower court.

Append"ici'tis, an inflammation of the vermiform appendix. The proportions of the appendix vary in different animals. In the horse it is about twice the size of the stomach, and performs, as in many other animals, an important function in the digestive process. The human appendix is a small, wormlike pouch projecting from the first division of the large intestine. It is about three inches long and about the size of a lead pencil. It has no particular function and can be removed without inconvenience or loss. Inflammation may arise from a variety of causes, such as wounds or strains, from pressure or the presence of some foreign body in the appendix. The chief cause of appendicitis, however, is believed to be the action of bacteria on an injured membrane of the appendix. The disease is accompanied by sharp pains, fever, nausea and vomiting. If attended to in time the patient stands a good chance of recovery; but if neglected, ulceration often takes place, the tissues become perforated and death results. An operation by a skilled physician is the safest and surest treatment for appendicitis, and should not be postponed until the disease has had time to make headway and the whole body is more or less weakened by its ravages and less able to withstand the ordeal of an operation than in the early stages.

Ap"percep'tion, the process by which the mind classifies new perceptions in the light of past experiences. It is well illustrated in the familiar story of the men passing the tree and commenting upon it. The carpenter saw in it a fine stick of timber; the hunter thought a squirrel's nest might be hidden in its branches; the scientist recognized it as a member of an unfamiliar genus; the tanner spoke of its thick, dark bark. Though the senses of each, sight and touch, had received the same impressions, each man's attitude of mind, that is, his apperceiving power, caused him to place a different emphasis upon them, and each interpreted the impressions by what was most vividly in his consciousness. Each apperception becomes a permanent possession of the mind in that it aids in giving color to the next experience in the same way that previous experiences have influenced this one; but in each case apperceptions are individual; they belong to ourselves alone and are never wholly shared with others.

It is possible to learn only that which is apperceived or which is adjusted to its proper relation in the mind. Hence the process of learning consists of two parts, the proper preparation of the mind

and the proper presentation of the material. In school a lesson presented to a class of 20 is being received in 20 different ways or, in some cases, owing to the unreadiness of the mind, is not being received at all. Children because of their limited experience have difficulty in interpreting much that is said to them, and through imagination often form false ideas which are exceedingly difficult to correct.

On the other hand, as we become older, we find greater difficulty in breaking away from old ideas and in receiving new ones. Thus the majority of people late in life are apt to be overconservative, since their mental adjustment is not easily rearranged. Though new arguments and unassailable proofs are presented at that time, the mind soon reverts to the old ideas and sets aside or wholly forgets the new. Apperception, adjusting impressions to a right relation, is active in youth, and what we learn then influences us through all future time, coloring our subsequent actions and changing over our views of life.

Ap'pian Way, the most famous Roman road, begun in 312 B. C. by the censor Appius Claudius Cæcus. It reached at first to Capua and was later extended to Brundisium. It was 350 m. long and from 14 to 18 ft. wide, with paths for foot passengers extending on each side. It was built at vast expense and constructed so well that parts of the road still remain. Troops made swift marches along this road in the martial days of Rome, and it was the great highway between Rome and the East. For a long distance from Rome the road was lined by tombs and monuments of the rich and famous.

Ap'pius Claudius Crassus, a Roman Decemvir from 451 to 449 B. C. He is chiefly remembered for his plot against Virginia, daughter of a plebeian named Lucius Virginius. Appius Claudius gained possession of Virginia by force and strategem. Virginius was hurriedly summoned from the army by his friends to rescue his daughter, but at the mock trial, held in the Forum, she was adjudged to be the property of the Decemvir. Thereupon the unhappy father, to save his daughter from dishonor, slew her. In the outburst of popular indignation that followed, Appius Claudius was deposed. He died in prison by his own hand or was strangled.

Apple, a widely-known fruit tree of the Rose Family raised for its ever welcome fruit, also known as the apple. The tree has a characteristic rugged form of growth which, if once known, is seldom mistaken; the bark is scaly, but underneath is apt to have a pinkish flush that renders the trunk noticeable. The leaves are thick, light green and ovate in shape. Under cultivation the trees are usually pruned so as to form a rounded top, and they are seldom allowed to exceed 25 ft. in height. The tree in the spring is one of the lovely sights of the early year, for its waxy, pink-white blossoms are of unsurpassed beauty, and their fragrance perfumes the air all about them; even the old gnarled trees which do not produce marketable fruit are often spared because of their profuse blossoming. These blossoms are the state flower of Michigan and Arkansas.

Have you plucked the apple blossoms in the spring?
In the spring?
And caught their subtle odors in the spring?
Pink buds pouting at the light,
Crumpled petals baby white,
Just to touch them a delight—
In the spring.

If you have not, then you know not, in the spring,
In the spring,
Half the color, half the wonder in the spring,
No sweet sight can I remember
Half so precious, half so tender,
As the apple blossoms render
In the spring.

William Martin.

The tree, which is native in Europe, in its wild state is small and bears small, sour fruit. It is frequently spoken of as

the crab and is the ancestor of the cultivated apples as well as of the crab apples. All of the numerous varieties have been produced from the crab and the common apple. The fruit of the tree is a solid fleshy kind of berry known as a pome, having in the center a core which encloses the seeds. The apple lends itself so readily to shipment and is so widely grown that the luscious fruit is known everywhere. Bailey says there are over 1000 varieties in the United States and an English authority speaks of 2000 grown in Europe.

Because it is so common the apple is apt to be neglected, but the best fruit is produced only when care and attention are given to the trees. The soil may be enriched by the planting of clover, cowpeas or beans and turning them under, but the orchard should not be used as a pasture. Proper pruning of the trees to suit the variety of apple and the locality is also essential. In general, the early varieties are most successful in the warmer climates and the late varieties or "winter apples" in the colder. Much care must also be taken in the picking, packing and storing in order to give the fruit the high commercial value and preclude decaying. The fruit keeps best if stored at a temperature of 31° F. Wrapping each individual apple improves the keeping qualities but is not considered commercially profitable. The average crop in the United States is 200,000,000 bushels, a great part of which has been raised in New York, Pennsylvania, Ohio and Michigan. At present, however, the Western States, particularly Washington, Oregon and Idaho, are paying especial attention to the apple crop and are not only raising the largest and best apples but are raising a greater number of barrels each year. Canada produces several million barrels annually.

The apple is the most valuable fruit of the temperate climates, if not of the world. It can be stored and kept for months without injury and it can be evaporated and shipped in dry form to any part of the world. It is among the most choice of table fruits and lends itself to a variety of treatments for culinary purposes. The expressed juice is familiar as cider, and from it the best quality of vinegar is made. By boiling, cider is also converted into jell, and by distillation into cider brandy. Apple butter is made by cooking the fruit in cider and adding spices. The pomace, that is, the crushed mass from which the cider has been extracted, is dried and shipped to Europe, where it is used in the production of certain varieties of wine. The seeds are planted by nurserymen to produce new trees. Some of the best known and useful varieties are the Baldwin, Northern Spy, Spitzberg, Greening and Dutchess.

Apples are attacked by numerous insects. Of these the codling moth does the most damage (See CODLING MOTH). The apple maggot, the grub of a small two-winged fly, does much damage in New York and New England, and the apple-tree borers attack the trunk and destroy the life of the tree. Among diseases the apple scab and rust are the most destructive. Valuable suggestions for preventing these pests and diseases can be obtained by writing the United States Department of Agriculture at Washington, also from the agricultural experiment station of those states whose apple industry is important. See FUNGICIDE; INSECTICIDE; GRAFTING.

Apple of Discord, the golden apple which Eris, or Discord, angered by not being invited, threw among the divine guests at the wedding of Peleus and Thetis. It was inscribed "Let the beauty take me," and was claimed by Juno, Minerva and Venus. Fearing to decide so delicate a question, Jove referred the matter to Paris, whose judgment was to be final. Each claimant tried to bribe the young shepherd: Juno, with an empire; Minerva, with intellectual and martial fame; Venus, with the most beautiful woman in the world. Paris rendered his decision in favor of Venus, thereby incurring the wrath of her rivals, which culminated in the Trojan War. See PARIS.

Apple Worm. See CODLING MOTH.

Appleton, Wis., a city and the county seat of Outagamie Co., 90 m. n.w. of Milwaukee and about 30 m. s.w. of Green Bay, on the Fox River and on the Chicago, Milwaukee & St. Paul, the Chicago & North Western and other railroads. At Appleton are the falls of the Fox River, which, with a descent of 50 ft., furnish abundant water power; and by means of a series of dams the river is made navigable for steamboats and constitutes a shipping outlet to Lake Michigan through Green Bay. Chief among the city's manufactures is paper, of which Appleton is one of the largest producers in the United States. Other manufactures are machinery, furniture, sulphite fiber, knit and woolen goods, agricultural implements, dyes, flour and wire screens. Appleton is the seat of Lawrence College, an interdenominational, coeducational institution, founded in 1847 and named for Amos Adams Lawrence of Boston, one of its donors. One of the first cities in the United States to have an electric street railway, Appleton now has trolley lines which connect it with all the principal towns of the Fox River Valley from Green Bay to Fond du Lac. It also has beautiful parks, a public library, two hospitals and a number of fine buildings. Settled in 1848, Appleton was incorporated as a village in 1853 and is administered under a revised charter of 1886. Population in 1920, U. S. Census, 19,561.

Ap"pomat'tox Courthouse, a village in Virginia, 25 m. e. of Lynchburg, the scene of General Lee's surrender of the Confederate Army of Northern Virginia to General Grant, Apr. 9, 1865. Here 28,000 men surrendered, about one-half of whom were effective, and this practically ended the Civil War. The articles of capitulation were arranged at the McLean House, in the village, Grant conceding that officers and men be paroled and that they keep their horses, "because they would need them for the spring plowing and farm work." Moreover, he especially ordered that there be no cheering or firing of salutes. See CIVIL WAR IN AMERICA.

A'pricot, a small tree of the Rose Family bearing sweet, juicy stone fruits, also called apricots. The tree is small and resembles the plum, of which it is a near relative. It is native in Armenia, but is extensively grown in India, China, Egypt, southern Europe and the United States. The fruits, which vary in size and color according to variety, are generally about the size of a small peach and of somewhat the same color; the skin, however, is smooth like that of the plum, and the meat juicy and fiberless.

Since apricots do not keep well, they are not so easily shipped fresh as are many fruits. Canned and dried, they form an important article of commerce. California is the chief source of apricots in the United States, although they are raised in all fruit-growing states. The crop in the United States averages about 4,170,000 bushels.

A'pril, the fourth month of the year, containing 30 days. The name is derived from a Latin word meaning to open, and is given to this month because in the north temperate regions the buds begin to open at this time. On ancient monuments April is represented by a dancing boy with a rattle. The first day of this month, April Fool's Day, is probably akin to the 31st of March among the Hindus, who play their little pranks upon that day. The April fool in Scotland is the April gowk, and in France the April fish. See MONTH; YEAR.

A Prio'ri and **A Poste"rio'ri,** Latin terms referring to two forms or methods of knowledge. To know or prove anything *a priori* is to do so on grounds preceding (Latin, *prior,* prior) experience, on the basis of innate ideas or knowledge which the mind possesses independently. *A posteriori* proofs or judgments, on the other hand, are founded on knowledge gained from observation and experience (Latin *posteriori,* following). Kant, who has introduced the modern usage of the terms, held that certain ideas, such as space, time and causality, for instance, are not derived from experience, but belong to the mind itself, that is, are *a priori.* Our knowledge as a whole, therefore, according to him is partly *a priori* and

partly *a posteriori.* In ordinary speech a thing is said to be proved *a priori* if derived deductively from more general principles or reasoned from cause to effect; and *a posteriori,* if derived inductively from observation. See INDUCTIVE METHOD; DEDUCTIVE METHOD.

Apsides, *Ap' si dez,* in astronomy the two points in the orbit of a heavenly body which are the farthest apart, or the points at the opposite ends of the major axis of the ellipse. When the earth and other planets in their revolution in their orbits reach the point nearest the sun, they are said to be in perihelion, and when they reach the farthest point, in aphelion. When the moon is nearest the earth in its orbit, it is in perigee, and when farthest away, in apogee.

Ap'teryx, a name applied to a family of flightless birds inhabiting New Zealand and called "kiwi-kiwi" by the natives. These birds are about the size of a small hen; the brown and grayish feathers are hairlike and hang loosely on the bird's body, which is destitute of true tail feathers. The wings are rudimentary, the bill is very long and somewhat flattened, the nostrils open near the end. The nest is made in a hole in the ground, in which a single very large egg is laid. The females are much larger than the males. The food consists principally of worms, and the birds feed mostly at night. Five species are known.

Aquamarine, *A" kwa mar een',* a fine variety of beryl, of a blue or sea-green color. The name is also given to certain varieties of quartz. Siberia and Brazil are celebrated for these gems and they have been found also in North Carolina. See BERYL; QUARTZ.

Aquarium, *A kwa' ri um,* a vessel in which living specimens of fresh water and marine animals are kept. The sides are usually of glass. The successful aquarium must contain living animals and plants, since animals consume oxygen and give off carbonic acid gas, and plants reverse the process, consuming carbonic acid and giving off oxygen. When proper proportions are maintained, the air in the water is constantly supplied with enough oxygen for the animal life in the aquarium, and the carbonic acid gas is consumed at the same rate that it is produced. The floor of the aquarium usually contains gravel and a few rocks. When the aquarium is intended for marine animals, it must contain sea water and seaweed. A large aquarium is frequently a part of the equipment of a zoological garden. The sides are made of plate glass, and light is admitted from above. The specimens can be distinctly seen and each tank is designed to represent the natural habitat of the specimens it contains. The largest aquariums in the United States are at Castle Garden, N. Y., and Detroit, Mich. The American Fish Commission also maintains an important aquarium at Washington. There are large aquariums at Naples, Paris, Hamburg, St. Petersburg and Brighton, England.

Aqua'rius (running water), the 11th of the 12 constellations of the zodiac. In Italy, at the season when the sun was in this sign of the zodiac copious rains fell, and so the name (running water) was given to it. The sign then corresponded with the constellation of the same name. On account of the precession of the equinoxes this sign is now in the constellation Capricornus. See STARS; ZODIAC; PRECESSION OF EQUINOXES.

Aquat'ic Plants, a name given to plants which are able to live wholly or partly under water or in extremely wet marshes. They are not of any particular family but are members of various groups. In general they are characterized by few roots; soft stems and foliage without stiffening or woody tissue; many large air spaces; thin epidermis; and threadlike leaves and branches. These peculiarities, however, are not essential and are more common in those plants which are wholly submerged, as seaweeds, water crowfoots and pondweeds. Many plants that are rooted under water have long stems which lift all of the leaves above the surface; such plants are the cat-tails, pickerel weeds and water lilies. The first two mentioned have what is known as aerial leaves since

AQUATIC PLANTS

Copyright 1912, Welles Bros. Pub. Co.

1. Papyrus Rush
2. Water Lily
3. Arrow-leaf Pond Lily
4. Pistia
5. Victoria Regia
6. Water Hyacinth
7. Lattice Leaf
8. Water Crowfoot
9. Aponogeton
10, 11. Lotus
12. Cocoanut Palm
13. Mangrove

they are lifted wholly into the air and have the same functions as ordinary leaves; the lilies have floating leaves, or those with one surface upon the water and one in the air. Still another class of aquatic plants, like the duckweeds, have only water roots and float about taking their nourishment wholly from the air and water. Bladderworts and water hyacinths have the ability to grow either in land or water; the former are supplied with bladderlike cells at the bases of their root leaves, which float the plants about on the surface of the water. If the plants find a suitable location they attach their roots to the soft ground near shore and become temporary or permanent land plants. The water hyacinth, however, if placed in soil, undergoes a transformation of its roots, which makes it difficult for it to return to its aquatic habits.

Bulbs which grow in water as well as in the ground cannot, strictly speaking, be called aquatic plants, as they live more upon the nourishment stored in the bulb than upon that derived from the water.

Aqueduct, *Ak' we dukt,* a term denoting an artificial conduit or channel for conveying water, generally in large quantities and to long distances. Before the use of metal pipe, great structures of stone were erected in a form like bridges to carry a city water supply across valleys. In China there are aqueducts which were built before the Christian Era. Rome was supplied by nine aqueducts. In Persia and Assyria there are seen remains of structures that were once aqueducts. Excavations have shown that the water supply of Jerusalem was brought from near Bethlehem and Hebron. The aqueduct at Segovia, Spain, built by the Romans, has been greatly admired. In Lycia, Asia Minor, there is an aqueduct consisting of a series of blocks of stone, each block having a hole bored through it. These are laid end to end, and are cemented together, forming a continuous pipe a mile in length. Throughout the older countries there are many aqueducts in ruins.

The Croton and the Catskill aqueducts, which furnish the water supply for New York City, are marvels of engineering skill, built at a cost of several hundred millions of dollars and capable of conveying almost a billion gallons of water daily. An aqueduct 240 m. long supplies the city of Los Angeles. In many of the Western States irrigation canals supply farms with their necessary water (See IRRIGATION). Aqueducts are constructed to supply water for mining operations, the water being conveyed from great heights in mountainous regions in steel pipes, and producing an enormous pressure when discharged at lower levels. This water is used to move and float away the rocks and gravel containing the minerals that are desired. This operation is known as dydraulic mining. See WATERWORKS; PUMP; SIPHON; MINING.

Aqui'nas, Saint Thomas (about 1227-1274), a celebrated theologian, born near Aquino, in Italy. He joined the Dominican Order about 1243 and afterwards taught at Cologne, Paris, Rome, Bologna and Pisa. He was canonized in 1323. Of his writings, all of which were in Latin, the most important is the *Summa Theologiæ,* which is one of the authoritative documents of the Roman Church, and the first attempt at a complete theological system. The central idea of St. Thomas' doctrine is that the soul and body of man are substantially united and are coprinciples in his being.

Ara'bia, a kingdom in southwestern Asia, extending south from latitude 37' north; bounded on the east by Mesopotamia, the Persian Gulf, and the Red Sea; on the South by the Gulf of Aden and the Arabian Sea; on the west by the Red Sea, Palestine and Syria. Politically, it is the kingdom of the Hedjaz, geographically, it is the westernmost of the three southward projecting peninsulas of Asia, connected with Africa by the Isthmus of Suez. As a kingdom it is one of the results of the World War. The Sherif of Mecca, El Hussein ihn Alli, revolted against Turkey, allied himself with the British forces, and rendered great assistance in the prosecution of war in that section. The important cities of

the new kingdom in the northwest are Damascus, Homs, Hamah, and Aleppo. Damascus is the capital. The possession of Aleppo gives the new kingdom control of the Bagdad railroad east of Aleppo and the Medinah branch south. On the southwest it possesses the holy cities of Medinah and Mecca and thus the ruler of Arabia is the religious head of the Mohammedan world.

It is the aim of the Hedjaz to unite in one political whole all the petty Arab powers. Thus the Hedjaz will be a nation compact in Asia, consisting, ethnically, of one people, the Arabs. It is a revival of the Saracen kingdom of centuries ago, with an estimated area of about 1,000,000 sq. m. and a total population of about 10,000,000.

A large part of Arabia is unexplored but that which has been traversed is chiefly barren desert, interrupted by occasional oases; there are mountainous regions at the north, and these slopes are wooded and descend to fertile plains of short extent.

The climate of Arabia is fickle; sudden violent changes of temperature occur during all seasons of the year. In many places the cold is frequently severe, but Maskat, at the east, is one of the hottest inhabited places upon the globe. Though Arabia is mainly desert, the few fertile tracts yield a variety of products. The date palm seems to thrive everywhere; figs, tamarinds, oranges, lemons and citrons are among the other fruits, while the perfume-bearing plants have long been among the chief reasons of "Araby's" fame. Other products are wheat, rice, barley, bananas, melons, vegetables, coffee, almonds, balsam, senna, gums and durra, or Indian millet. The chief source of the wealth of Arabia is its carrying trade and the long caravans often 1000 camels in a train, exchange the fine cloths of India for ivory, gums and valuable woods of Africa.

Arabia is regarded by many ethnologists as the original home of the Semites, while the Arabs are the purest representtives of the original stock. There are two great classes of the Arabs; the Al Bedoo, or dwellers in the open; and the Al Hadr, or dwellers in fixed locations. The former class include the Bedouin, tribes of the desert. They are wanderers by reason of their occupation and environment. They must move with their flock from place to place. The great need of the new country is settled government and education. There are no schools or education in the western sense of the word. But the history of the Arabian people gives the assurance that a new cycle is opening for Arabia.

It was Semitic tribes from Arabia that laid the foundation of our present civilization in Mesopotamia whence it spread to the world at large. So much of Arabian history is mixed with legend that little can be told up to the time of their adoption of Mohammedanism. The Arabs became zealous in the spread of their faith, and their religious enthusiasm gained for them political power. Wherever the Arabs went they collected manuscripts and books which they carried back to Arabia. These were all carefully translated into Arabic, copied and the originals burned; thus much of our learning is from Arabic sources, although it probably originated elsewhere. Algebra, however, we no doubt owe wholly to the Arabs. In the days of the Saracens, Arabia was the seat of the most powerful and enlightened people in the world. Scholars have pointed out how much the revival of learning in Europe was due to Saracenic influence. Finally we must not forget that three of the great religious systems of the world came from the Semites; Judaism, Mohammedanism, and Christianity.

Arabian Gulf. See Red Sea.

Arabian Nights Entertainment, The, a famous collection of Arabic stories. They were first introduced into Europe early in the 18th century through the translation of a French Orientalist named Galland. The story which connects the tales is as follows. The Sultan Shahriyar was so angered by the faithlessness of his bride that he made a law that each of his future wives be put to death on the morning after marriage. Finally

Shahrazad, the daughter of the grand vizier, succeeded in outwitting her cruel husband by narrating each day a fascinating story which had to be finished on the morrow. Numerous translations since the time of Galland have been made in different languages, and these stories are the delight of people of all ages and nationalities. It is not known who is the author of the original Arabic work, nor when it was first composed. These stories are also known as *The Tales of Shahrazad.*

Arabian Sea, an arm of the Indian Ocean, lying south of Asia and washing the shores of Hindustan upon the east and the Arabian Peninsula upon the west. The Gulf of Oman connects it with the Persian Gulf and the Gulf of Aden with the Red Sea. In its broadest extent it is about 1500 m. It contains a few well-known groups of islands, chief among which are the Laccadive and the Maldive.

Ar'abs, a people belonging to the Semitic race. They are generally divided into the two groups, North Arabians and South Arabians, those in the south being known as Bedouin Arabs. In physical structure the Arab surpasses the average European. His features are lean and clear-cut, his skin brown, his eyes black, his face oval and his forehead straight and low. He is courteous and hospitable, but he is also cruel, untruthful and superstitious. He is stern, unsmiling, tranquil and intelligent. In mental power the Arabs surpass most races of mankind. They have no system of public education and children are trained wholly in the home. See BEDOUINS.

Arachne, *A rak' ne,* a Maconian maid, in myths, whom Minerva had taught to weave and embroider so beautifully that the nymphs would leave their nooks and crowd around to admire her work. This made Arachne vain. She even challenged her teacher to a test of skill. Minerva appeared to the girl in the guise of an old woman and counseled her to withdraw before it was too late; but Arachne persisted, whereupon the goddess assumed her divine form and the contest began at once. Minerva filled her web with scenes depicting the greatness of the gods; Arachne chose those of their foibles. Minerva was incensed at the presumption displayed, so, striking the web with her shuttle, she tore it to pieces; then, tapping Arachne, she filled her with such humiliation that she hanged herself. But Minerva decided that Arachne should not die; rather, she should live forever, always spinning. Sprinkling her with wolfsbane, Minerva transformed Arachne into a spider. From this incident the Spider Family is named Arachnida.

Arachnida, *A rak' ni da,* a group of the division, Arthropoda, and represented by the horseshoe crabs, spiders, mites, scorpions, etc. The group is made up of exceedingly varied forms whose most distinguishing mark is the character of their different appendages. The anterior pair are not antennæ, or feelers, but are so divided as to form nippers. The legs of the forepart of the body differ radically from the others, and the anterior part of the body is covered by a single, somewhat horny covering called the carapace; the posterior part is made up of two segments. From a study of fossil forms it is concluded that the Arachnids were once aquatic animals with gills rather than lungs. See ZOOLOGY, subhead *Classification.*

Ar'ago, Dominique François (1786-1853), a French physicist and astronomer, born at Estagel, near Perpignan, in the Department of the Lower Pyrenees. When 17 years of age he went to Paris, where he entered the Polytechnic School, distinguishing himself under Legendre. In 1804 he became secretary of the Observatory of Paris. Two years later he and Biot took up their residence in a hut on the summit of Mt. Galatzo, among the Eastern Pyrenees, for the purpose of assisting in making certain measurements of longitude that were to serve as the basis of the metric system of weights and measures. Before these observations and calculations were completed war broke out between France and Spain, his signals to his coworkers

were misunderstood by the government, he was taken to be a spy by the Spaniards, and imprisoned, being released only after suffering great hardship. In consideration of his sufferings in the interest of science, the rule concerning age was suspended, and, though only 23 years old, he was elected member of the Academy of Sciences in Paris, of which he became perpetual secretary in 1830. For important discoveries in magnetism he was awarded the Copley medal of the Royal Society of London in 1825. Arago was a popular lecturer of great power on scientific subjects, as well as a fine prose writer. In the revolution of 1848, he was appointed minister of war and marine.

Ar'agon, a former kingdom occupying the northeastern part of Spain and now comprising the provinces of Teruel, Huesca and Sargossa. Ferdinand V was its last independent ruler. After his marriage with Isabella of Castile, the two kingdoms were united.

Araguaya, *Ah rah" gwa yah'*, or **Araguay,** a river of Brazil. It rises in the Serra Cayapo, flows north, joins the Tocantins near San Francisco and empties into the Atlantic Ocean about 50 m. east of the mouth of the Amazon. About 1300 m. long, it is navigable for half that length.

Ar'al, a lake in Russian central Asia, situated about 150 m. e. of the Caspian Sea. Its maximum length is 230 m., its width 182 m. and its area about 25,052 sq. m. (excluding four large islands containing 1000 sq. m.). It is the fourth largest lake in the world, being surpassed in size only by Lake Superior, Lake Victoria Nyanza and the Caspian Sea. The quantities and varieties of fish it contains are unusually large; though salt, it has less salt than the ocean, and it freezes over far inward. Navigation is carried on to a small extent, despite the shallowness of its waters. The history of the lake is interesting in that it is thought that the area it occupies has twice been dry within historical times.

Arap'ahoe, a tribe of American Indians formerly dwelling on the plains between the Platte and the Arkansas rivers. They number now about 2000, and are under instruction and guidance of the whites in the reservations of Oklahoma and western Wyoming.

Ar'arat, a fertile plateau occupying the central part of the mountainous region of Armenia. From *Genesis* we learn that Noah's Ark rested on the "mountains of Ararat," and though the term is generally given a sufficiently wide significance to embrace the entire district, it is more specifically attached to one of the highest peaks, the "steep mountain," or "Noah's mountain." The greater of its two volcanic cones rises about 17,212 ft. above sea level, and it is, next to Mt. Demavend, the loftiest elevation in western Asia. Earthquakes are frequent, the one of 1840 causing great ravages as it completely buried the village of Arguri, which had been built in the ravine at the base of the mountain; and it is no longer, with its mild climate and former beauties, the favorite summer resort of the wealthy population of Armenia.

Arbe'la, Battle of, the third and decisive victory of Alexander over Darius in 331 B. C., was really fought about 20 m. from Arbela at Gaugamela. This is one of the 15 decisive battles of the world. By his victory, Alexander overthrew the Persian dynasty and established Western rulers in its stead, thus making way for the extension of Greek civilization into western Asia. The town is situated in the Turkish Province of Bagdad; its modern name is Erbil and it has a population of 4000.

Arbitration, Industrial, a method of settling labor disputes without resorting to strikes. The usual method of procedure is for both parties to the dispute to agree upon a commission, to whom all the facts at issue are submitted. After thorough investigation the commission makes a report, which includes a plan of settlement. If both parties agree to the plan, all difficulties are adjusted without interruption of the industry involved. Arbitration may be voluntary or compulsory. It is voluntary when the parties of their own accord agree to this

method of settlement. It is compulsory when a state or national law requires the submission of labor disputes to a commission appointed or provided for by the state. New Zealand and the states of Australia have compulsory arbitration laws, and Canada has a partially compulsory law that has proved very satisfactory. Nearly all states in the Union have state boards of arbitration which are expected to use their influence to settle labor disputes without strikes, but their authority is advisory only. The president of the United States is authorized by law to appoint any member of the interstate commission or the court of commerce to act with the commissioner of labor to arbitrate disputes affecting railway employees. Many serious disputes have been adjusted by these commissions without interference with traffic.

Compulsory arbitration is generally opposed in the United States as un-American, but the tendency to submit labor disputes to arbitration is increasing on the part of both employers and employees. See STRIKES AND LOCKOUTS.

Arbitration, International, the settlement of disputes between nations by tribunals whose members are appointed by the nations interested. International arbitration has arisen because of the complicated relations that are the outgrowth of modern means of transportation and communication and the wide extent of international commerce, and is of comparatively recent date, there being but few cases previous to the 19th century. It is now universally recognized as the most humane and economical means of settling international disputes, and is usually resorted to in all cases except those in which a vital principle involving the honor of one or both parties is involved. The frequency of cases calling for arbitration has led to the establishing of a Permanent Court of Arbitration at The Hague, to which all cases may be referred, provided both nations to the controversy consent. See PEACE CONFERENCE, INTERNATIONAL.

Arbitration, International Court of. See PEACE CONFERENCE, INTERNATIONAL.

Arbor Day, a day set apart by legislative enactment of many states to encourage the voluntary planting of trees by the people. It was inaugurated by the Nebraska State Board of Agriculture in 1874, following the suggestion of J. Sterling Morton, afterwards secretary of agriculture during President Cleveland's administration, and was designated the second Wednesday in April. It is now observed, either as a legal or a school holiday, by nearly every state, and school children especially are urged to observe it by planting young trees.

Arbor Vitæ, a fragrant shrub of the Pine Family, growing wild in rich Northern woods, and farther south planted in hedges or for ornament. There are many varieties produced in greenhouses and by horticulturists. The ordinary arbor vitæ grows to a height of about four feet and is distinguished by its sprays of flat, scalelike leaves, seeming to be jointed. These leaves have a pleasing, balsamlike odor and taste. The fruit is a cone, which is short and never hardens, as do those of many of the pines. Each of the blunt scales of the cone bears two winged seeds. The golden arbor vitæ has a golden-tinted leaf; this is a greenhouse variety, however, and not often found elsewhere.

Ar'butus, called the trailing arbutus or Mayflower, a member of the Heath Family. Its shrubby stems, covered with rough hairs and crowded with olive-

TRAILING ARBUTUS

green, leathery leaves, creep along the ground and produce fragrant, white or pink tubular flowers almost before the snow is gone. The leaves are evergreen, rounded, often terminated by a sharp

point, and serve to protect and conceal the delicate blossoms. Arbutus is found in scattered localities in the North in pine woods or barrens, notably in the New England States, northern Michigan, Wisconsin and Minnesota, but it is also known as far south as Florida. It is especially loved for the early appearance and the waxy purity and fragrance of its blossoms. The leaves appear in June and form noticeable patches in the woods.

Arcadia. The central part of Ancient Greece. Being mountainous, its inhabitants were mostly shepherds, and Arcadia became noted as a country where simplicity and innocence marked the life of its inhabitants. In process of time, the name lost its geographical significance and is now used by writers to indicate any idealized place of rustic perfection. It is so used by Sir Phillip Sidney.

Arch, in architecture, a curved structure used to span an opening, and in a building to support that part of the structure which is above the arch. Formerly the arch was constructed entirely of stone, wedged-shaped pieces being used to form the arc of the circle. The piece at the top of the arch is called the keystone. The Egyptians were probably acquainted with the principle of the arch, but they seldom made use of it. It was extensively used by the Romans first in the construction of bridges and aqueducts, and later in the construction of buildings. Through the Romans the use of the arch was extended over Europe and the British Isles. When the American colonists began to construct bridges over rivers, they used the modern truss instead of the arch. Later stone arches were employed, and in recent times these have given way to steel arches. The steel arch, which supports the carriage bridge below Niagara Falls, has a span of 840 ft., and at the time of its construction was the longest arch in the world. See ARCHITECTURE; BRIDGE.

Archæology, *Ar"ke ol' o jy,* the science which deals with the history and life of ancient peoples, as shown by the remains belonging to an early period of their existence. Archæology divides the primeval period of the human race into the Stone, the Bronze and the Iron ages, basing the division on the remains found in Europe.

Archæopteryx, *Ar"ke op' ter ix,* an extinct animal, the fossil remains of which were found in Bavaria in 1861. It is the oldest-known species of bird. Combining as it does many features peculiar to birds and to reptiles, it constitutes a connecting link between these two groups. It was about the size of a crow; was birdlike in form, having wings furnished with feathers arranged as those of the modern bird; and had a short, blunt beak, the upper jaw of which was provided with 13 teeth and the lower with three teeth on each side. It had a long, cumbersome, lizardlike tail.

Archangel, an important Russian seaport situated at the mouth of the River Drina, on the White Sea. Up to 1916 it was Russia's only open seaport in Europe, all others being on the Baltic Sea. During the World War the importance of Archangel was much emphasized. The harbor is closed by ice from September to July. Its chief exports are fish, furs, skins, wax, tallow, timber, iron, caviar and bristles. One of the finest cathedrals of Europe is located here. Population in 1919, 37,987.

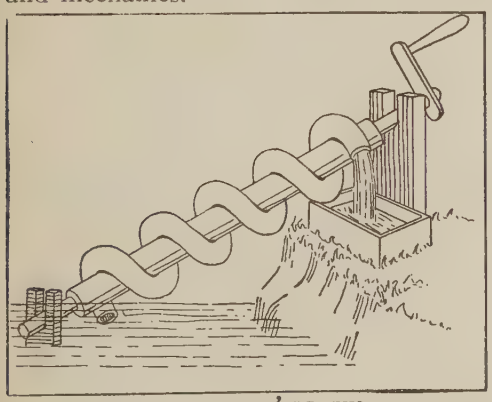
Ar'chery, the use of the bow (and arrow). The bow was included among the most effective weapons of the ancient world, and is still used both in warfare and in the pursuit of game by some primitive peoples. In ancient times the Egyptian, Assyrian, Persian and Parthian archers were especially skillful; and later both Greeks and Romans employed the bowmen of various countries in their wars. It is impossible to enumerate the important battles won by the archer; but Hastings, Crécy, Poitiers and Agincourt were among these. Homer has extolled the skill of Ulysses with the bow; while Vergil introduces archery in the *Æneid* and Scott does the same in *Ivanhoe;* and Schiller has given William Tell a permanent place with the Robin Hood of English fame.

After the introduction of firearms,

however, the bow and arrow gradually disappeared from civilized countries, save as a means for exercise. It has remained for the English and American archery associations of recent years to restore this splendid sport to some degree of popularity. In America there are now annual contests of the National, the Potomac and the Eastern Archery associations.

Modern targets have concentric rings of gold (in the center), red, blue, black and white; which, in scoring, have a value of 9, 7, 5, 3 and 1 respectively. Competitions may be for 96 arrows at 60 yards; 48 arrows at 50, at 40 or at 30 yards, or as arranged between the contestants.

Archimedes, *Ar"ki me' deez,* (287-212 B. C.), the greatest mathematician of antiquity, born in Syracuse, Sicily. He invented the endless screw for the launching of ships, the Archimedean screw, which raises water, the catapult and burning mirrors, improved the methods of finding centers of gravity, and discovered the principle of the lever. At the defense of Syracuse, he fired the Roman ships with his powerful burning glasses, and later was slain by a band of marauding soldiers, while pondering in his study over a problem in physics. His important extant works are one on arithmetic and three each on plane geometry and mechanics.



ARCHIMEDES' SCREW

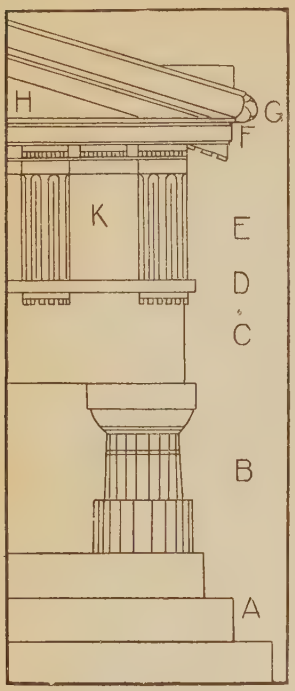
Archimedes' Screw, a machine, whose invention is accredited to Archimedes and whose purpose is raising water. It consists of a hollow cylinder in which is a tube wound about a central axis. One end of the tube is immersed in the water to be raised, while the axis slants upwards in such a manner that the upper end of the tube is held at the height to which the water is to be raised. By revolution of the axis the water pours out at the upper end of the tube. The Archimedes' screw is capable of raising water to a height of 20 or 30 ft. with comparatively slight exertion.

Ar'chitec"ture, the science and art of building. Formerly the architect concerned himself only with the design of the building, but now he must be a practical builder as well as a designer, since he is usually required to place his approval upon all construction work from plans that he has drawn. In its broadest sense architecture applies to the construction of the rudest dwellings of primitive peoples; as the term is ordinarily used, it applies to the construction of large buildings, particularly churches and other public buildings, bridges, aqueducts and the like, and much of the architect's work is closely related to that of the civil engineer. The first work in the construction of an edifice consists in making the plans, and, in planning his structure, the architect should be guided by three essential qualities, stability, utility and beauty. Formerly much more attention was given to stability and beauty, as the ruins of the temples and other structures of ancient times show, but in modern times utility has become the architect's first consideration.

Passing by the early structures of primitive peoples, we can best study the development of architecture by considering it under the different nations and periods in which it has made distinct advancement.

EGYPT. Ancient Egypt is considered the birthplace of historic architecture. The Great Pyramids, near Cairo, completed at least 3500 B. C., were built long before there were any known permanent buildings in Europe or Asia. The Great Pyramid, originally covering 13 acres

and having a height of 480 ft., is one of the greatest architectural wonders of the world, though it does not exhibit so much of skill as of strength, and in point of architectural significance it has little in comparison with the wonderful temples at Karnak, Luxor and Abydos, erected at later periods, or the extensive tombs of Beni-hassan and other places, excavated in solid rock. Egyptian architecture reflects the religious belief of the people. All the ruins are of tombs or temples. The Egyptians believed that the body must be preserved after death for the soul to dwell in, hence they built their tombs for eternity, and gave little attention to their houses, which they considered but temporary abodes. The structural forms employed were few and simple, consisting of large round columns, with capitals carved in imitation of the buds or blossoms of the lotus, or swelled into bell-shaped forms, and square piers, fronted by figures of Osiris for supports. The roofs of the temples consisted chiefly of flat stones supported on pillars, while the construction of the inner chamber of the Great Pyramid indicates that the Egyptians knew the principle of the arch, although they did not apply this principle in the construction of their temples. The walls of the structures usually were much thicker at the base than at the top, and their temples were entered through massive gateways or Pylons, whose ruins are still the wonder of the world. See Abydos; Karnak, The Temple of; Luxor, The Temple of; Pyramids.

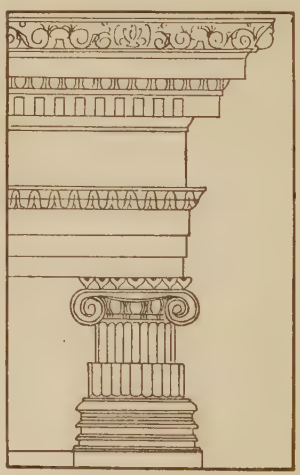


DORIC COLUMN

A, base; B, column; C, architrave; D, tenia; E, frieze; F, horizontal cornice; H, tympanum of pediment; K, metope.

Assyria and Babylonia. Assyrian and Babylonian architecture is also of great antiquity, but the materials in which these people worked, sun-dried and burnt brick, were not so enduring as the granite and limestone of Egypt. However, notwithstanding these limitations, they reared elaborate structures, ornamented with enameled brick and carved alabaster slabs. They borrowed much of their ornamental designs from the Egyptians and later passed them on to the Persians, who adapted them to an order in which the column was a prominent feature.

Greece. In simplicity and beauty of design the ancient Greeks excel all other people, ancient or modern. While not the originators of the column, it was under their skill that it was brought to its highest degree of perfection.


IONIC COLUMN

The Greeks developed three orders of architecture, each designated by the column which characterized it. These orders are known respectively as the Doric, the Ionic and the Corinthian. To these the Romans added two others, the Etruscan and the Composite. The Greeks employed their skill in the construction of temples and other public edifices, never in the construction of private dwellings. The art reached its highest degree of perfection in the time of Praxiteles and the construction

SUPREME HEIGHTS OF ARCHITECTURE

THE PARTHENON, ATHENS

Crumbling ruins of "the glory that was Greece."

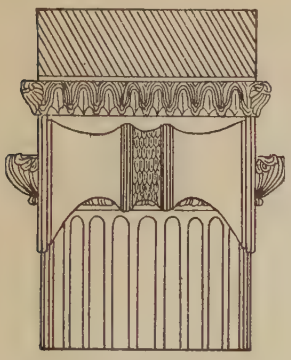
TAJ MAHAL, NEAR AGRA, INDIA

Many critics pronounce this marble mausoleum the most beautiful building in the world.

SAINT MARK'S CATHEDRAL, VENICE

ARCHITECTURE

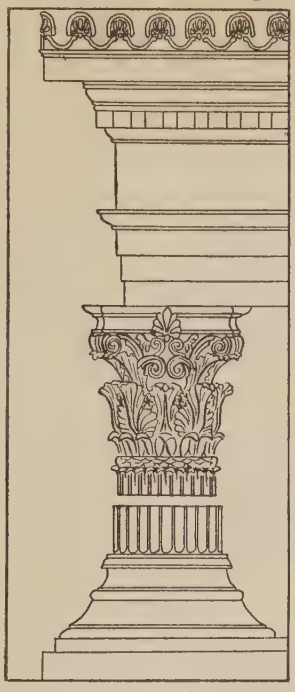
of the Parthenon and other buildings on the Acropolis (See ATHENS, subhead *Age of Pericles*). The Greek theater is also important, since it was the forerunner of the Colosseum at Rome, the stadium of later times, and has recently been reproduced in this country. Its chief characteristic was the rows of semicircular seats rising one above the other in the open air and facing an open stage.



IONIC COLUMN, SIDE VIEW

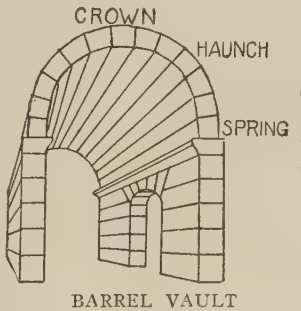
ROME. Before the conquest of Greece the Romans obtained their architectural designs from the Etruscans. They made frequent use of the round arch, which was never employed by the Greeks. They also made use of glazed tile or earthenware for finishing interiors. With the conquest of Greece the Romans added the Greek orders of architecture to their own designs, the result being a combination of designs, which, in the reign of Augustus and the emperors following, made Rome the most magnificent city in the world. The Romans became the masters in the use of the column, and many of their structures were characterized by beautiful colonnades supporting light roofs, while massiveness and size also characterized many of their structures (See COLOSSEUM). The adoption of the Greek orders of architecture by Rome and the influence of the Roman Empire upon the civilization of Europe caused the orders to gain a firm hold upon the countries of the West, where they were considered standard types for centuries.

BYZANTINE ARCHITECTURE. After the separation of the Eastern and Western empires, a new art and architecture appeared in Constantinople, to which the name Byzantine was applied. The chief feature of this type of architecture is a dome or cupola supported on four arches, at right angles to each other, known as a pendentive dome. The Church of St. Sophia, Constantinople, and the Cathedral of St. Mark, Venice, are the most striking representations of Byzantine architecture, and it prevails in nearly all Greek Catholic churches and many Mohammedan mosques.



CORINTHIAN COLUMN

ROMANESQUE ARCHITECTURE. When Rome was conquered by the Goths and Vandals the great works of art and architecture that adorned the city were nearly all destroyed and a new style of architecture known as the Romanesque arose. Its characteristic was the semicircular arch. Other features are crypts, ornamental facades in stone, towers, the vault, the groin vault and the ribbed groin. Some of the older churches in Rome, the Church of San Ambroglio, Milan, and the Abbey of Vezelay, in central France, are among the best examples of Romanesque architecture.

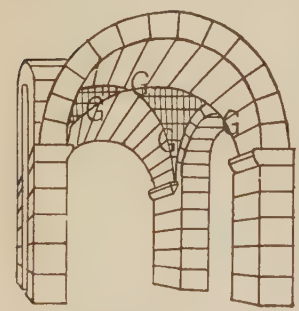


BARREL VAULT

GOTHIC ARCHITECTURE. The Gothic style originated in France in the 12th century and rapidly extended to other countries. Its chief characteristic is the

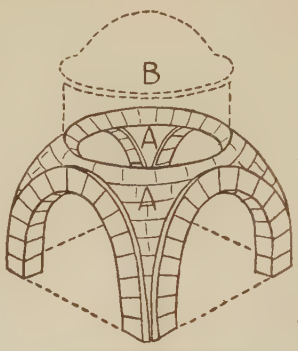
pointed arch and the subservience of all other features to this. The pointed arch was the result of an attempt to construct an arch with a more nearly vertical support than the rounded arch and thus admit of reducing the size of the supporting columns and walls so as to give more space for windows. The Gothic style is well suited to great cathedrals and churches and has been employed in the construction of some of the most famous church edifices in the world, notably the Cathedral of Cologne, Notre Dame in Paris, Canterbury and other cathedrals in England and the modern Cathedral of St. John the Divine in New York.

Renaissance Architecture. Renaissance architecture dates from the early part of the 15th century and was developed by Brunelleschi and his followers, among whom were Bramante and Michelangelo. The Renaissance was not so much the creation of a new style as the modification and blending of old styles so as to allow more space for wall decoration. It made the dome the chief characteristic of the churches and is represented by some of the most widely known cathedrals, chief among which is St. Peter's at Rome. Many palaces and public buildings in Florence, Rome, Venice and other Italian cities were also of the Renaissance style.



GROINED VAULTS

Modern Architecture. From the development of the Renaissance to the French Revolution the various styles of architecture described in this article prevailed throughout Europe, receiving slight modifications from time to time. Following the French Revolution there was a period in which practically no attention was given the artistic element in architecture. Since the time of Napoleon various combinations of the older styles have been used. The Gothic arch and the spire are common to churches that were erected previous to 1890. Since then the tendency has been towards the low dome and the tower without the spire. Much greater attention has been given to the utility of buildings than formerly. In recent years a new type of building, known as the "skyscraper," has become common in American cities. The construction consists of a steel frame and walls of tile or brick. The exterior is plain, and the interior is designed for utility.



PENDENTIVE DOME

Arc Light. See Electric Lighting.

Arc'tic Ocean, that portion of the water envelope of the globe which surrounds the North Pole and which extends to the Arctic Circle. It communicates with the Atlantic by a wide stretch of sea between Norway and Greenland and with the Pacific by Bering Strait. Several arms of the ocean indent the shores of the adjacent continents in the form of gulfs and bays. Chief among these are Baffin Bay, the Gulf of Ob and the White Sea; while that part of the Arctic lying between Norway and North Greenland is sometimes designated as the Greenland Sea. Among the large rivers that empty either directly into this ocean or into one of its divisions are the Lena, the Ob and the Yenisei in Asia and the Mackenzie in Canada. The principal islands in the Arctic Ocean are Greenland, the Spitzbergen group, Iceland, the Island of Nova Zembla and the archipelago known as Franz Josef Land. The entire Arctic region is a solid mass of ice in winter, which in the spring becomes partly broken up, large masses floating southward in the form

of icebergs. The water is extremely pure and varies in color from ultramarine to olive green. The region contains an abundance of animal life, lower forms being numerous near the surface and in the abysses. The most common of the fishes are the polar shark and cod, while the whale, seal and walrus also abound.

Arctu'rus, a star of the first magnitude and the principal star in the constellation Bootes. Although it travels in its orbit at the rate of 54 m. per second, its light takes about 25½ years to reach us. Arcturus may be located by continuing the curve of the three stars forming the handle of the Dipper. See STARS; BOOTES.

Areca, *A re' ka.* See BETEL.

Areopagus, *Ar" e op' a gus,* the oldest Athenian court of justice. Its place of meeting was on Mars (Ares) Hill, hence its name. Its existence dates from very early times, and it tried all crimes against society and the State.

Arequipa, *Ah ra ke' pah,* one of the largest cities of Peru, is situated on the Chile River, 100 m. n.e. of Mollendo, with which it is connected by railroad. The city is on a plateau 7000 ft. above the sea and is well laid out. The leading industries include the cutting of precious stones and manufacture of jewelry. It is also an important distributing center for the surrounding country. Population, about 35,000.

Arethu'sa, a beautiful woodland nymph, was the daughter of Oceanus, and a votary of Diana. Heated from the hunt, one day, she plunged into the refreshing waters of the River Alpheus. As she did so, the stream whispered in a human voice. Terrified, the nymph sprang to the shore, only to realize that she was being followed by the god of the river, who pursued her through all Arcadia. At nightfall, too weary to flee further, Arethusa prayed to Diana for protection. Immediately she was wrapped in a cloud, a wet sweat broke from her and her hair flowed around her in sprays; she had become a fountain. Alpheus resumed his stream nature and tried to mingle his waters with those of the fountain, which, still resisting, plunged through the bowels of the earth and reappeared in that part of Syracuse known as Ortygia.

One of our lovely wild flowers has been named Arethusa.

Ar'gand Lamp, a lamp having a tubular burner about which a cylindrical wick is drawn. The burner, also known as the Argand, surrounds an opening that extends through the center of the lamp to its base, and its value consists in its admitting air both inside and outside of the flame. The lamp gives a particularly bright light. It is the invention of Aimé Argand of Geneva.

Argen'ta, Ark., a city of Pulaski Co., on the Arkansas River, opposite Little Rock. The surrounding country is engaged in farming and stock raising. Cotton is an important crop. In the city are cotton compresses, cottonseed-oil mills and other industrial plants. Within the last few years the name of the city has been changed to North Little Rock. Population in 1920, 14,048.

Argentina, *Ahr jen te' na,* a republic of South America occupying a roughly-triangular territory whose apex is the southernmost point of the continent. It is bounded on the n. by Bolivia and Paraguay, on the e. by Uruguay, the Atlantic Ocean and a portion of Brazil, on the s. by Chile and the Antarctic Ocean and on the w. by the long strip of Chile. The Andes form a natural boundary on the w.; that on the e. is formed by the Uruguay River.

PHYSICAL CHARACTERISTICS. This great territory, whose area is 1,135,840 sq. m., has no great variety in its physical features. From the Andes, or Western Cordilleras, the land slopes chiefly in extended treeless plains, to the Atlantic. Some of the highest peaks of the Andes form a part of the boundary of Chile; Aconcagua, 23,080 ft. high, is the chief of these. Just south of it lies the famous Cumbre Pass, through which a railroad has just been built connecting Buenos Aires and Valparaiso. The plains, called respectively the upland

pampas and the lower pampas, are covered with the tall, plumy, pampas grass, intersprinkled with innumerable flowers. In character they resemble the Western plains of the United States. The soil covering them is a deposit of silt from an ancient lake and is so uniform in quality that sometimes for 100 m. not a stone can be found. At the north these plains disappear in great forests of valuable timber trees.

Argentina has many great rivers, all of which naturally seek the Atlantic. The Parana, the Uruguay, the Pilcomayo and the Bermejo join in one great river, or estuary, known as the Rio de la Plata, lying between Uruguay and Argentina. Many of the lakes and rivers of the south become dry in summer, though in other seasons they are not unimportant streams; the Colorado and the Negro are, however, exceptions to this.

Climate. Argentina lies almost wholly in the temperate zone, occupying south of the equator the same position as the territory from Mexico City to Hudson Bay does north. The extremes of temperature are, however, not found in Argentina. The climate is healthful, especially in the region of Buenos Aires, which is remarkable for its pleasing climate. Because the country lies south of the equator, the seasons are the reverse of those in the United States; summer and the wheat harvest occur in January, while June and July are the cold months. The rainfall in general is limited, although in some regions it is as high as 120 inches annually.

Industries, Products, Etc. The vast plains of Argentina give unparalleled opportunity for agriculture, an industry which directly employs the majority of the inhabitants. Great herds of cattle and sheep are raised in the provinces about Buenos Aires, and pedigreed stock has been imported in such numbers that a high grade is everywhere established. Wheat, oats, barley, maize and rye are the chief crops, though cotton, tobacco and sugar cane are also raised. Only about four per cent of the land fitted for agricultural purposes requires irrigation. The flour mills, spinning and weaving mills and great meat-packing establishments care for the products of the farms. The government is especially generous to settlers, and out of the 237,768,000 acres of government-owned lands it grants free homesteads to pioneers and loans $1000 to anyone needing it for the purchase of stock or outfit.

The name Argentina means silver and refers to the great mineral wealth which was supposed to exist. Although not found in such marvelous quantities as was hoped for, gold, silver and copper are mined in many regions and are a great source of wealth. Galena, lead, coal, iron, bismuth and salt are the other minerals found. Argentina exports hides, tallow, wool, feathers, horns, beef and grains, the most of which go to Great Britain.

Government, People, Etc. The government of Argentina is much like that of the United States. Its executive is a president elected for a term of six years and ineligible for reelection. The Congress consists of a Senate and a House of Deputies; members of the former are chosen by special electors in each province and in Buenos Aires, while the members of the House are elected directly by the people. The vice-president presides over the Senate but has no political power. The president and vice-president must be Roman Catholics and natives of Argentina. The president's cabinet consists of eight secretaries, and the judicial system is much like that of the United States. The constitution was adopted in 1853 and has been twice amended.

The people of Argentina are a mixture of Spanish, Indian and Negro races. They are active and energetic and have proven themselves keen in business. Spanish is the official language. The Gauchos are an interesting group, always upon horseback, that make their living by capturing and training wild horses. Catholicism is the State religion. Schools are rapidly becoming common and education is free. As in all Catholic countries Church schools are the most popular. At present there are many normal

schools and colleges as well as schools of special instruction. There are five great universities, all of which are well patronized.

History. Argentina was first visited by the Portuguese in 1515. The English navigator, Sebastian Cabot, entered the Rio de la Plata in 1527 and built a fort on the present site of Buenos Ayres. But Argentina passed under the control of Spain and formed a part of the vice royalty of Peru. It remained a Spanish possession for nearly three centuries but was one of the first to dissolve allegiance to Spain (1816). Since that date it has remained independent. Population 1919, estimated about 10,000,000.

Ar'gon, an element discovered by Prof. Ramsay and Lord Rayleigh in 1895. It is a constituent of air, in small quantity. Argon is a gas, heavier than nitrogen but resembling it in many ways. It has one striking peculiarity; it is not known to unite, under any circumstances with any other element; hence its name, which means inert or idle.

Argonaut. See Paper Nautilus.

Ar'gonauts, a fabulous band of 50 heroes who sailed with Jason in quest of the Golden Fleece which Jason was required to present to his uncle, the reigning king of Thessaly before the king would surrender the throne to Jason, the rightful heir. After many adventures the Argonauts reached Colchis, on the east shore of the Black Sea, where the fleece was hanging on a tree, guarded by a sleepless dragon. With the assistance of Medea, daughter of the King of Colchis, the monster was drugged and the fleece secured. Jason and his band then returned to Thessaly with his prize, accompanied, of course, by Medea.

Argonne Campaign, *Ar gun'*. The Argonne is a forest-clad plateau region in northeastern France, east of Reims and north of Verdun intersected by the Aine and the Meuse rivers. It is known in French history as the scene of a celebrated campaign in 1798. But the Argonne Campaign of 1918 is far more notable, and for American readers far more interesting. It was made by American soldiers, under command of Gen. Pershing, who forced their way from a line running west of Verdun to Sedan, slightly northeast a distance of about thirty miles. The object of the drive was to cut the German line of retreat near Sedan.

This campaign has been called the world's greatest battle field. If successful, it would compel the surrender of the German forces and so every advantage was taken by the Germans of the surface features to check the advance. The entire section is rough and broken, intersected by gullies, and heavily forest-clad. Machine guns were placed in every easily defended position and the best soldiers of Germany disputed the way. The drive began October 5. It was pushed to completion November 5. It is interesting to note that when Sedan was entered, German commissioners were hurried to Senlis and the war was over.

Ar'gus, in Greek mythology, a monster of great strength, credited with having a hundred eyes, only two of which slept at one time. At the command of jealous Juno he guarded Io, whom she had changed into a heifer. When Mercury slew Argus, the queen of the gods set his eyes in the tail of her favorite bird, the peacock.

Argyll, *Ar gyle'*, or **Argyle, Campbells of,** a Scotch family remarkable for the large number of its scions who have become celebrated in English and Scotch history. The founder of the family fame was Colin, Lord Campbell, who was created a peer in 1457. Archibald, fifth Earl of Argyle, was an adherent of John Knox and a staunch advocate of religious reform; and he is conspicuous for the part he played in English history in the time of Mary Queen of Scots. He became lord high chancellor of Scotland, and died in 1573. Archibald Campbell, eighth Earl of Argyll, was a strong opponent of Charles I. He brought about fundamental changes in the constitution of Scotland.

Argyll, John Douglas Sutherland Campbell (1845-1914), Marquis of Lorne and ninth Duke of Argyll. In

1871 he married the Princess Louise, fourth daughter of Queen Victoria. He served as governor-general of Canada from 1878 to 1883.

Ariad'ne, the daughter of fabulous Minos, King of Crete. Having fallen in love with Theseus, she gave him a long clew of thread by which he retraced his way out of the labyrinth, after he had slain the Minotaur. Theseus took her with him when he left Crete, but, ordered by Minerva, abandoned her while she slept, on the Isle of Naxos. Here Bacchus found and married her. The golden crown, which he gave to her, was thrown into heaven on her death.

The recumbent *Ariàdne* of the Vatican is one of the choicest pieces of statuary in Italy.

Aries, *A' ri eez,* the Ram, the constellation from which the zodiacal sign Aries took his name. About 2000 years ago the sign coincided with the constellation but on account of the precession of the equinoxes the sign Aries is now in the constellation Pisces. Aries (both constellation and sign 2000 years ago, but only the sign now) is the first sign of the zodiac; and the first point of Aries (the sign) is and always will be, unless the present system is changed, at the vernal equinox, about March 20. Its sign is ♈, representing the Ram's horns. The constellation may be recognized by three stars of the second, third and fourth magnitudes forming an obtuse triangle, with the brightest star at the top. See CÓNSTELLATIONS; ZODIAC; EQUINOX; RĪGHT ASCENSION.

Ar"ios'to, Lodovico (1474-1533), Italian poet, born at Reggio, in Lombardy. He early applied himself to the study of the best Latin authors and his first literary productions were lyric poems in the Latin and Italian languages. At the age of 30 he commenced his most important work, an epic poem in 46 cantos entitled *Orlando Furioso.* This poem he published in four editions, in each of which he improved the original. The English poet, Edmund Spenser, used the Italian poem as a model for his *Faerie Queene.* Ariosto combined great imaginative power with a cultivated literary taste, and his descriptions are characterized by beauty, pathos and grace. Dramatic compositions and satires in the form of epistles comprise the rest of his literary work.

Aristi'des (about 550-about 468 B. C.), Athenian statesman and patriot. He opposed the naval policy of Themistocles and advocated that the army of Athens be strengthened to meet the Persian invasion. Party spirit ran so high that Aristides was ostracized. He returned in time to take part in the Battle of Salamis (480) and was elected general soon after. In 478 the Ionian allies turned in disgust from Pausanias and asked Aristides to take the chief command of the fleet of the new Confederacy of Delos and to decide upon the assessment of each member of the Confederacy. He afterwards returned to Athens, and aided Themistocles in deceiving the Spartans until the wall of Athens was built. He was noted for his honesty.

Ar"istip'pus, a Greek philosopher, born at Cyrene, Africa, about 435 B. C. He was a disciple of Socrates but he taught that the pursuit of pleasure was the chief aim of man, and this was the central thought of the Cyrenaic School of Philosophy which he founded. The Cyrenaic School of Philosophy paved the way to Epicureanism.

Aristophanes, *Ar" is tof' a neez,* (about 448-about 385 B. C.), a Greek comic dramatist and poet, born probably in the deme of Cydathene. He wrote about 40 plays, of which 11 are extant. His satire is effective and keen, and turns from personal and political attacks in his early works to caricature of social conditions in his later writings. His use of language and rhythm, his wit, humor and light mockery, and, above all, the lyric beauty of his songs and chants leave a suggestion of combined fertility and richness of imagination such as few others, except Shakespeare, have possessed. Among his works are *The Banqueters, The Babylonians, The Acharnians, The Knights, The Clouds, The Wasps, The Peace, The Birds, Lysis-*

trata, The Frogs and *The Women in Parliament.*

Ar'istot"le (384-322 B. C.), a famous Greek philosopher and one of the world's greatest thinkers, born at Stagira, a Greek colony in Thrace. His father was the court physician and friend of the King of Macedonia, and the home influences doubtless helped to establish the son's mind in the habits of accuracy and exactness for which he was afterwards celebrated. In his 18th year, both parents having died, he went to Athens and became a pupil of Plato at the Academy. Here he remained for 20 years, until the master's death. During this period he himself became noted for his own brilliant writings and lectures. After Plato's death in 347 B. C., Aristotle resided for three years at the court of Hermias, ruler of Atarneus, whose sister or niece, Pythias, he married. He then repaired for a time to Mitylene; and in 343-342 B. C. was summoned to Macedonia by King Philip to take charge of the education of his son Alexander (the Great), then 13 years old. This relationship bore fruit not merely in the education of Alexander, but in the generous financial support of Aristotle in the further prosecution of his scientific studies.

After Alexander had ascended the throne and departed on his Eastern conquests, Aristotle, now in his 50th year, returned to Athens and opened a school of his own in the Lyceum, a gymnasium attached to the temple of the Lyceian Apollo. From the walks of the Lyceum, or from Aristotle's custom of teaching while he walked up and down with his pupils, the school came to be known as the *Peripatetic* (Greek *peripatos*). It attracted not merely beginners, but ripe scholars as well. With the latter and his advanced pupils Aristotle spent the morning in mature philosophical discussions; and in the evening he lectured to larger companies in a more popular manner. After the death of Alexander the Great, Aristotle's friendship for Macedonia was regarded as dangerous to Athens, and a charge of impiety was brought against him. Mindful of the fate of Socrates, he fled to Chalcis, where he died the following year.

As Plato was the representative disciple and successor of Socrates, so was Aristotle of Plato. Nevertheless, Aristotle marks a new advance in the development of systematic thinking. In general terms, this advance was in the direction of a better understanding of the concrete world of sense. Plato's chief interest was in the world of ideas, which he regarded as the real world that could alone be accurately known. He proceeded, therefore, from the certainties of the world of ideas to an interpretation of the empirical world. Aristotle reversed this process. His interest centered chiefly in the world of experience; and from the definite knowledge gained there he proceeded to interpret the more indefinite ideal world. Plato proceeded from the general to the particular, from the idea to the object. Aristotle proceeded from the particular to the general, from the object to the idea contained in it. Plato's chief significance, therefore, is for philosophy regarded as metaphysics; Aristotle's, for philosophy regarded as the synthesis of knowledge or of the sciences.

For this reason Aristotle is of even greater importance for science than for philosophy. He was the father of science. He determined its scope and invented its method. He observed and classified the facts of nature and of life gathered from as wide a range as possible; and then proceeded to interpret these facts by the discovery of their natural laws and the ultimate reality contained in them. This was done by means of the inductive method, of which he was the originator (See Inductive Method). He thus became the founder of many sciences unknown before him, and gave to others an independent position. Physiology, natural history, logic, grammar, rhetoric, literary criticism, politics, psychology, may all be traced back to him. He was the first to attempt a history of philosophy and a study of comparative politics.

Aristotle's philosophy, therefore, is

encyclopedic in character rather than constituting a unified system. Even the various divisions of philosophy which he gives vary from one another. He has made no one of them the basis of his system. He deals, however, with all the great problems that had been treated by Plato in his threefold division. What Plato called dialectics, Aristotle calls *first philosophy,* which he defines as the science that treats of the ultimate being, upon which the empirical sciences are based and which they presuppose. His followers called this *metaphysic* because Aristotle treated it after (*meta*) his treatment of physics. His *logic* seems also to include this, as well as the discussion of the laws of correct reasoning. *Logic* in the latter sense, remains today essentially as it was worked out by Aristotle. What has already been said about his *physics* indicates sufficiently the central importance which it held in his system, and his method of investigation. Man, as the end of nature, must be studied as a part of it, and here the science of empirical psychology emerges. *Ethics* is more closely connected with physics by Aristotle than by Socrates and Plato. The sensations and passions play a larger part. The highest good is the happiness or satisfaction gained from rational activity in a perfect life. Such well-being cannot be secured by the individual in isolation, but only in the community or state.

Aristotle's writings have exercised an enormous influence upon the world's thought. In early times they stimulated scientific inquiry; in the Middle Ages they affected the course of theology and became the framework of Scholasticism; in modern times they helped to overthrow Scholasticism and create a spirit that assumes Aristotle's own empirical attitude toward the world. The list of his works reveals the universality of his studies. This is more evident from the fact that only about one-sixth of his writings are supposed to have come down to us. These may be classified as follows: treatises on *Logic,* later collected under the title of the *Organon;* the *Rhetoric* and the *Poetics;* the work on the *First Philosophy;* the works on *Natural Science; Ethics* and *Politics.* Each of these divisions contains a large number of separate works. A good English translation is that by Jowett. See Socrates; Plato; Philosophy.

Arithmetic, the branch of mathematics which treats of relations and properties of numbers generally expressed by figures. It was probably, like most branches of mathematics, first used to a great extent in Egypt, although all peoples must have understood by instinct the simplest number relations which are learned by children without other instruction than their own instinct. The first mathematical records which are known, however, are those of the Arabs, who gave their name to the system of notation in general use. These figures, however, are now thought to have been first used by the Hindus, from whose manuscripts the Arabs gained much of their mathematical knowledge. The Greeks and Romans made less progress in arithmetic than in any other of the known branches of mathematics, probably owing to their cumbersome notation, which was the only system used in England until after the middle of the 11th century and is still employed under the name of Roman notation. With the introduction of the Arabic figures came also the use of the decimal and the long-needed introduction of the character 0, or zero, which had been lacking in both Roman and Arabic notation and was probably first introduced in the seventh century.

In the 16th century the famous Rule of Three, now known as compound proportion, was discovered, and arithmetic became one of the great fundamental subjects of modern education. With reading and writing it has since occupied a prominent position on all grammar school courses of study. The last great advance in arithmetic was the invention of logarithms in the 17th century (See Logarithm). At present the study of arithmetic includes all mechanical operations which are based upon the primary

operations of addition, subtraction, multiplication and division by means of figures, and makes use of many practical applications of the processes thus learned. See Study Guides.

Ari'us (about 256-336), the father of Arianism, the doctrine that Christ was not of the same essence as God the Father, but was the highest of created beings. He was born in Libya, in North Africa. Going to Alexandria, he was advanced in the church until he became presbyter, and pastor of one of the large city congregations. In 321 he was condemned and deposed for his views concerning the nature of Christ, and the ensuing controversy led to the famous Council of Nicæa, which met in 325. Here the views of Arius were condemned and he was banished, but the controversy continued for half a century. Constantine, whom Arius had won over, directed that he should be received into the Church of Constantinople, but Arius died just before the day set for the ceremony of restoration. See NICÆA, COUNCILS OF; NICENE CREED; ATHANASIUS, SAINT.

Arizona, one of the Mountain States, is bounded on the n. by Utah, on the e. by New Mexico, on the s. by Mexico and on the w. by Nevada, California and Lower California.

SIZE. The length and breadth are almost equal, being about 350 m. Its total area is 113,956 sq. m., of which 146 sq. m. are water. In size Arizona is a little less than Missouri and Mississippi combined, or nearly twice as great as the New England States combined; it is the fifth state in the Union in area.

POPULATION. The population in 1920 was 334,162. The decade from 1910 to 1920 showed a gain of 129,808, or 63.1 per cent. There are 2.9 inhabitants to the square mile and the state's rank in population is 46.

SURFACE. The surface of Arizona consists of three distinct divisions: the great Colorado Plateau region in the north, a zone of mountain ranges through the south-central part and the desert plains of the southwest. The Colorado Plateau presents a varying stretch of picturesque scenery, consisting of deep canyons of rivers, towering buttes, verdant snatches of valley, dry gullies and monotonous levels. The Grand Canyon of the Colorado, unparalleled in its magnificence, makes a deep cut in the northwest; the chief mountain masses are the Black, Tunicha, Carrizo, Lukachukai, White, Mogollon, Zuñi and Apache in the north and east; and the Baboquivari, Gila, Pinaleño, Peloncillo, Galiuro, Santa Catalina, Castle Dome, Eagletail, Big Horn, Dome Rock, Chocolate, Palomas and Harquahala in the south and west. The highest peak is the volcanic San Francisco, rising above Flagstaff to an altitude of 12,794 ft. Other peaks are Thomas (11,496 ft.), Escudillo (10,691 ft.), Graham (10,516 ft.), Ord (10,266 ft.) and Greens (10,115 ft.). The desert region of the south contains plains and small valleys, and near the Mexican boundary are regions of shifting sand. The Painted Desert along the Colorado River in the north is famous for the bright and variegated colors of its shales, sandstones and clays. In Navajo County, near Holbrook, is the marvelous chalcedony, or petrified, forest, the most remarkable of its kind in the United States. The trees have been washed down to the foot of the mesas, and the trunks, about four feet thick, lie broken and cracked in wondrously colored blocks.

RIVERS. The Colorado is the large river of the state and has a course of about 400 m., generally southwest and south, after entering from Utah on the north. The Salt River, sometimes called the Salado, which has become such an important factor in the Reclamation Service, has its source in the mountains of eastern Arizona and western New Mexico. It receives the supply of the Verde at its junction with it at the head of the Salt River Valley. The Verde has its source in central Arizona. These rivers unite with the Gila, which flows across the southern part of the state, and form the chief tributary of the Colorado. Smaller streams are the Virgin, Little

Colorado, or Colorado Chiquito, Bill Williams Fork and San Pedro. During the dry season most of these streams run dry, and often their course is temporarily lost in the sands.

Climate. The atmosphere is dry and the heat in summer is seldom oppressive, while the winters are invariably delightful. The difference of altitude between the northern and southern parts causes a wide range of climate, and on the sandy plains of the southwest the temperature often reaches the height of 120° in the shade, the hottest region north of the Isthmus of Panama. The mean temperature varies from 45° in the north to 69° in the south. The heavy snows of the north do not cover the mountains perpetually with snow. The clouds that carry rain and snow come from the Gulf of Mexico, and rarely from the Pacific Ocean or the Gulf of California. The rainfall is uneven, the mean annual precipitation at Flagstaff being 24.65 inches, and at Yuma 2.84 inches. As the state is not within the path of storm frequency, the weather is more uniform than in more northern latitudes. The four seasons are in reality reduced to two, spring and summer. The climate of southern Arizona has been likened to that of Italy in its clear atmosphere and cloudless sky. The state has become a health resort for invalids afflicted with catarrhal and pulmonary troubles which frequently result from an overplus of moisture in air and soil.

Minerals and Mining. Mining represents the principal industry of Arizona. The chief minerals are gold, copper, silver, sulphur, cinnabar, borax, zinc and lead. The clay products are significant and the deposits of mica, nickel ores, limestone, fluorspar, granite, tungsten, turquoise, garnet, vanadium and chalcedony are important. The copper mines are among the greatest in the world. In 1910, 295,275,527 lb. were produced. Arizona ranks fifth among the states and territories in the production of silver, and sixth in gold. The lead industry is growing in importance, and valuable mines of nearly pure asbestos have been opened during the last decade.

Forests and Lumber. The large forest reserves set aside by the government include those of San Francisco, Prescott, Black Mesa, Santa Catalina, Santa Rita, Grand Canyon, Chiricahua and Mt. Graham. The mountainous regions are forest-clad, being covered principally by pine, juniper, cedar and other valuable timber. The trees native to the plains are 75 species of cacti, or saguaro, ironwood, Jerusalem thorn, paloverde and mesquite. Along the banks of the streams are numerous cottonwoods. The largest unbroken pine forest in the United States is in Arizona.

Agriculture. Agriculture is increasing in importance as an industry through the effective means of irrigation which have been established within recent years. A large amount of the land is public or reservation land. The term *desert land* no longer exists, but there is good land to be purchased from owners of titled land which is unimproved. Over a quarter million acres are cultivated. The valley lands are fertile to an unusual extent. With the full completion of the government irrigation reservoirs at Roosevelt Dam and the Tonto Basin, about 10,000,000 acres additional will be reclaimed to the people. The value of property for taxation purposes shows a great increase.

Soil. The plateaus of Arizona are covered with what is commonly known as mesa soil. In the southern part of the state are sandy loams and heavy adobe. Along the rivers are small areas of overflow plains of fine sediment which have a large percentage of soluble matter which plants can absorb.

Products. Among the principal and staple crops are alfalfa, corn, sorghum, barley, wheat, oranges, lemons, grapefruit or pomelos, wine grapes, sweet potatoes, limes, pomegranates, watermelons, olives, dates, figs, peanuts, sugar beets and cantaloupes. Vegetables and temperate fruits do excellently, and the yield in small fruits, apricots, peaches, plums and pears is large. The farming that is carried on is extensive, and crop

follows crop in rapid succession in the proper season. As many as seven cuttings of alfalfa per year can be obtained and the cuttings run from one and one-half to three tons per acre. The beet-sugar industry is very important. The average yield is from 25 to 40 tons of sugar beets to the acre, with a high percentage of sugar. The long season is of great advantage. There are fine native grasses, and on the southern plains are sagebrush, greasewood, cactus and yucca.

Stock raising has been fully developed. Cattle raising ranks first in importance and sheep raising next. The most nutritious grasses affording pastures for the cattle are in the northern part; in the irrigated regions of the south are good opportunities for fattening the stock. The dairy cow is also in evidence and the market for dairy products is unlimited. The production of wool is significant. Ostrich farming has grown to be a profitable industry; on a dozen or more farms in the Salt River Valley are more than 6000 ostriches feeding on the alfalfa products, valued at about $1,000,000.

MANUFACTURES. The smelting and refining of copper represents the chief manufacturing industry of the state. The crushing, milling and amalgamation of ores is also of great importance. The great increased railroad facilities and the building of many miles of state highways and several big bridges across the Gila, Verde and Salt rivers have given a new impetus to the development of the vast mineral resources. There are a few lumber, flour and grist mills, and shops for the manufacture of cars and general shop construction, as well as for repairs by steam-railway companies. Recent experiments with canaigre as a source of tannin have proved successful. Onyx marbles are polished in Phoenix. The Indians of the various tribes make baskets, pottery, rugs and woolen blankets, all of which bring high prices.

COMMERCE AND TRANSPORTATION. The railway mileage of Arizona is 2109 m. The principal roads are the Southern Pacific, crossing the state from east to west in the southern part, and the Santa Fe, in the northern part. There are also branch lines and minor divisions extending to important cities in the state; connections with Mexico are maintained by the El Paso & Southwestern system and by branches of the Southern Pacific connecting with the great West Coast system in Mexico. The southern portion of the state has excellent interurban electric service.

GOVERNMENT. The constitution was adopted in December, 1911. It provides for a Legislature of two branches—a House of Representatives of 35 members and a Senate of 19 members. The sessions are practically limited to 60 days and are held biennially. The constitution provides for the initiative, referendum and recall, and for a general primary for the nomination of all state officers and United States senators. All state officers are elected for two years. The Supreme Court consists of three judges elected for six years, one being chosen at each election. Woman suffrage was adopted in 1912. Trusts and monopolies are carefully regulated.

FORESTRY. The national forest reserves are protected by rangers in the employ of the Forest Service of the United States Department of Agriculture. This service patrols the reserves as a protection against fire and trespass, supervises the grazing privileges and sells timber under proper regulations. The area of national forests in Arizona is 14,811,145 acres.

EDUCATION. The public school system of the state is good and education is compulsory. The public-school fund amounts to $1,500,000 and great land grants. The schools are maintained more or less by local taxation; because of the fact that the population is largely rural, there are not a large number of graded schools. There is a state university at Tucson, normal schools at Tempe and Flagstaff, and high schools at Prescott, Phoenix and Mesa. The Arizona School of Music, the finest conservatory in the state, is located in Phoenix. There are several government schools for Indians. One

of these schools, the second largest in the United States, is situated about five miles from Phoenix. Other Indian schools are located at Tucson and Rice Station.

State Institutions. There is an asylum for the insane three miles from Phoenix. In 1903 the first juvenile reform school, known as the Territorial Industrial School, was opened at Benson. A state prison, formerly at Yuma, was replaced recently by a new and modern building at Florence, Pinal Co. There is also a state pioneers' home located in Murphy's Park overlooking the city of Prescott. This institution is a fitting tribute to the persons who endured the hardships in building up a civilization in the pioneer days of Arizona.

Cities. The principal cities are Phoenix, the capital, and the following county seats: Flagstaff, Tucson, Yuma, Prescott, Florence, Holbrook, Globe and Nogales. Other important towns are Mesa, Bisbee, Tempe, Peoria, Glendale, Williams and Douglas.

Resorts. Few places can compare more favorably than Arizona in the variety of its resorts. By traveling but a short distance and getting into higher or lower altitudes one may change from the semitropics to the pine-clad mountains. The Castle Hot Springs, renowned for their curative waters, are situated in the foothills of the Bradshaw Mountains, 40 m. north of Phoenix. The Grand Canyon, the wonder of the world, over 5000 ft. deep and 13 m. wide from rim to rim, is located in northern Arizona. Other resorts are Oak Creek, Prescott Iron Springs, White River and Casa Grande in the Gila Valley.

History. Several friars entered Arizona near the middle of the 16th century, and the first white missions were established by Franciscans in 1629. They were destroyed by the raids of the Pueblos in their general uprising in 1680. More successful efforts were brought about a few years later by the Jesuits, the mission of San Xavier del Bac being established about 1700 and that of Guevavi in 1732. When New Mexico was conquered by Gen. S. W. Kearney in 1846, Arizona represented a portion of that territory. The part of the state north of the Gila River came into the possession of the United States in 1848, by the Treaty of Guadalupe Hidalgo; the southern half was acquired through the Gadsden Purchase in 1853. Arizona was made a separate territory in 1863. During the Civil War the land was left unprotected and suffered seriously from the raids of the Apaches; the reestablishment of military posts, however, restored prosperity, and the development of the country has been rapid. Several attempts were made to secure statehood, chiefly in 1906, but Arizona objected to the proposed union with New Mexico, and the territory remained unchanged until the passage of the statehood act in 1910. The first governor of the state, after its admission to the Union, Aug. 21, 1911, took oath of office on Feb. 14, 1912. The first State Legislature convened on March 18, 1912.

Arizona, University of, at Tucson (1885). Organized by act of the Territorial Legislature, the university opened in 1891. The organization has been divided into three departments: the College of Letters, Arts, and Sciences, which includes the School of Law and the School of Home Economics; the College of Agriculture, including the Agricultural Experiment Station and the Extension Service; and the College of Mines and Engineering, which includes the Arizona Bureau of Mines and the U. S. Bureau of Mines Experiment Station. The University campus comprises sixty-five acres, and the number of permanent buildings is now nineteen. The Library contains over 30,000 volumes, to which important additions are made annually.

Ark, the floating vessel built by Noah in which he and his family and various animals were preserved during the deluge (Gen. VI). Measured by the common standards of today, the ark was 450 feet long, 75 feet wide and 45 feet high.

Ark of the Covenant, the sacred chest which the Hebrews made for the special purpose of containing the two tablets on which were engraved the Ten Commandments. The Ark was made of shittim, or acacia wood, the boards being overlaid with gold, both without and within (See *Exodus xxv, 10-21*). In accordance with its sacred character, it was borne by priests in advance of the people while on the march. In later years, when the Israelites became corrupted, the Ark was taken from them by the Philistines. Restored to the Tabernacle through the efforts of David, it was finally transferred to Solomon's Temple at Jerusalem, and is supposed to have been destroyed with the Temple when Jerusalem was taken by the Babylonians.

Arkansas, *Ar' kan saw,* THE DIAMOND STATE, one of the West South Central States, is bounded on the n. by Missouri, on the e. by Missouri, Tennessee and Mississippi, from which it is separated by the Mississippi River, on the s. by Louisiana and on the w. by Texas and Oklahoma.

SIZE. The extreme length from north to south is 250 m. Its breadth from east to west varies from 175 to 250 m. The area is 53,335 sq. m., of which 810 sq. m. are water. Arkansas is a little larger than North Carolina, a little smaller than Illinois and about the size of England and one-half of Wales; it is the 26th state in size.

POPULATION. The population in 1920 was 1,752,204. From 1910 to 1920 there was a gain in population of 177,755, or 11.3 per cent. There are 33.4 inhabitants to the square mile and the state's rank in population is 25.

SURFACE. A line drawn diagonally across the state from the point where the Black River cuts the northern boundary, to the point where the Red River cuts the western boundary, would have the highlands to the north and west and the lowlands to the south and east of it. The northern highlands are formed by the Boston Mountains, which are a branch of the Ozarks from Missouri. Many of the streams of this region flow through canyonlike gorges which they have cut in the rock.

The second highland region is formed by the Ouachita Mountains, which extend into the state about 200 m. from Oklahoma. This region is separated from the other by the Valley of the Arkansas River. In this range is Mt. Mansfield, 2833 ft., the highest point between the Appalachian and the Rocky mountains.

The eastern part of the state consists of lowlands which descend to the bottom lands of the Mississippi, a region from 40 to 50 m. wide. Much of the bottom lands is frequently overflowed, notwithstanding the numerous dikes and levees built by the government to protect it. To the west of this strip and extending across the southern part of the state, the region is characterized by low hills and fertile valleys.

Taken as a whole, Arkansas has the greatest variety of surface and the most attractive scenery of any state bordering on the Mississippi.

RIVERS. The Mississippi forms most of the eastern boundary, and the Arkansas flows across the state from east to west, dividing it into nearly equal parts. The White River and its tributary, the Black, enter the state from the north. The Red River crosses the southwestern part, and the Ouachita drains the southern part of the state.

CLIMATE. In the lowlands bordering on the Mississippi the climate is hot and damp, but in the highlands it is noted for even temperature and general healthfulness. The mean temperature of the state for the winter is about 39°, and for the summer about 80°. Rainfall is heaviest in the eastern part of the state and lightest in the western; in the central part it varies from 50 to 60 inches a year. No sections are subject to drought or extremes of temperature. Snow is practically unknown.

MINERALS AND MINING. Coal measures lie along both sides of the Arkansas River and extend from the western border to the center of the state. Coal min-

ing is an important industry and is increasing each year. The novaculite, or Arkansas, oilstones are quarried in Garland, Hot Spring and adjoining counties. These are considered the best whetstones in the world. A coarser variety of this rock is also used for grindstones.

There are valuable deposits of zinc and lead ore in the northwestern part of the state in the Ozark region. Iron is also found in this locality. Manganese is found in the north-central part of the state, as are limestone, sandstone, granite and marble. Bauxite, porcelain and fire clays also occur. Petroleum and natural gas have been found, as have phosphate rock, asphalt and graphite, in the southern part of the state. Here also are extensive deposits of a variety of chalk valuable for the manufacture of Portland cement. The state is rich in minerals and many of these resources are awaiting future development.

Forests and Lumber. The state contains extensive forests in which are found numerous varieties of hard and soft woods. There are large tracts of oak, pine, cypress, hickory, black walnut, hornbeam, ash, elm and other varieties of wood valuable for lumber. In the Arkansas Valley are found red cedar, cottonwood, maple and numerous varieties of oak. The hardwood forests are considered among the most valuable in the country.

The lumber industry has developed rapidly since 1890. In 1905 the state ranked sixth in the Union in the production of lumber, and the output is constantly increasing.

Agriculture. Agriculture is the chief industry and provides occupation for the largest number of people. Both soil and climate are extremely favorable to the production of a great variety of crops.

Soil. The most fertile soil is found in the bottom lands along the rivers. As one proceeds to the higher elevations, soils of varying degrees of fertility are found. In general, the upland soils consist of a rich loam and are suited to the production of excellent crops.

Products. Cotton is the leading crop in point of value, the annual output amounting to over 1,000,000 bales. A part of the cotton land is considered among the best in the South. Corn ranks first in acreage among the cereals and is second only to cotton in value.

The western half of the state is one of the most productive fruit regions in the country, and produces pears, prunes, plums and grapes in large quantities. Apples are remarkably successful in the northwestern part of the state, and this region is widely known for the variety, extent and quality of its apple crop.

Manufactures. The leading manufacturing industries are connected with lumber and lumber products. The other industries in the order of their importance are the manufacture of cottonseed oil and meal, the manufacture of flour and other gristmill products, and of brick and cars.

Commerce and Transportation. The rivers afford about 2000 m. of navigable waterways for boats of light draught. Several of these streams have been improved by the United States Government, which has also constructed numerous levees to prevent the overflow of the lowlands in the southeastern part of the state. The state has upwards of 40 lines of railway, whose combined mileage exceeds 3500 m. These lines are so distributed that all sections are within easy reach of railway accommodations. Rates are controlled by a state railway commission.

The chief exports are cotton, lumber, fruit, whetstones and grindstones. A large part of the cotton, lumber, coal and other freight is carried on the rivers.

Government. The present constitution was adopted in 1874 and amended in 1893. The governor is elected for two years. He has a veto power, but his veto may be set aside by a majority vote of both houses. Legislative representatives are chosen for two years, senators for four years. The Legislature meets biennially, and the session is limited to 60 days, but it may be extended by a two-thirds vote of both houses. The congressmen and members of the Legis-

lature are chosen at separate elections. Constitutional amendments may be proposed by a majority vote of both houses of the Legislature and adopted by a majority vote of the people. Voters are required to exhibit poll-tax receipts.

The state courts are presided over by five judges elected for a term of eight years and eligible for reelection. Local justice is administered by County and Probate courts.

EDUCATION. Public schools are supported for both white and colored children by funds derived from state and local taxation. The absence of large cities and the sparse population of many rural sections make the public school problem a difficult one. Nevertheless the state is making good progress in its educational affairs.

The higher institutions of learning supported by the state are the University of Arkansas at Fayetteville, which maintains a normal department; a state normal school at Conway; and the normal school at Pine Bluff for colored students. Among the leading denominational schools are Ouachita College and Henderson College at Arkadelphia; Hendrix and Central colleges at Conway; Arkansas College at Batesville; Cumberland College at Clarksville; and Philander Smith College and the Arkansas Baptist College, both for colored students, at Little Rock. There are also a number of educational associations engaged in furthering the educational interests of the state.

STATE INSTITUTIONS. The schools for the deaf, dumb and blind and the state penitentiary are at Little Rock. The hospital for the insane and a state prison are in Pulaski County.

CITIES. Little Rock, the capital, is also the largest city. Other important cities are Texarkana, Pine Bluff, Hot Springs, Helena, Ft. Smith and Fayetteville.

HISTORY. The state and river are named from the Arkansas Indians, who were found occupying the region by the early French explorers. In 1803 Arkansas became United States territory as a part of the Louisiana Purchase; in 1812 it was made a part of Missouri Territory; and in 1819 Arkansas Territory was organized. Population increased slowly but steadily, and the territory became a state in 1836. From that time to 1861, when Arkansas became one of the Confederate States, the history of the state was uneventful. During the Civil War the battles of Pea Ridge and Pine Grove and several other minor engagements took place within the state. Difficulties arising from the war were not finally adjusted until 1874, when the present constitution was adopted. Since that date Arkansas has advanced along all lines of industrial and civic growth.

Arkansas City, Kan., a city and banking center of Cowley Co., 51 m. s. e. of Wichita, on the Arkansas River about 5 m. above the mouth of the Walnut River, and on the Atchison, Topeka & Santa Fe, the St. Louis & San Francisco, the Missouri Pacific and other railroads. The city is in a rich agricultural and stock-raising country, and a canal connecting the two rivers furnishes water power. Among the manufactures are lumber, flour, yeast, ice, creamery products, carriages, windmills, paint and mattresses. Situated close to the southern boundary of the state, Arkansas City carries on a considerable trade with the Indian agencies and military posts of Oklahoma. The place, first called Creswell, was settled in 1870 and two years later was chartered as a city. Population in 1920, 11,253.

Arkansas River, a river of the United States rising in the south-central part of Colorado and flowing southeasterly across Kansas, Oklahoma and Arkansas to the Mississippi. Its length is about 2000 m. Its chief tributaries are the Little Arkansas, the Cimmaron and the Canadian from the south, and the Neosho from the north. In the upper part of its course, it flows for nine miles through a remarkable pass in the mountains known as the Royal Gorge. Next to the Missouri, the Arkansas is the largest tributary of the Mississippi.

Arkansas, University of, at Fayetteville (1871). Its schools of medicine and of law are located at Little Rock, and it maintains a normal school for colored students at Pine Bluff. Its library contains upwards of 30,000 volumes. The grounds, buildings and equipment at Fayetteville are valued at about $1,100,000. The combined enrollment is approximately 1800 and there are about 85 professors and instructors.

Ark'wright, Sir Richard (1732-1792), inventor of the spinning jenny, born in England. He early became interested in the processes employed in cotton weaving in his native town of Preston, and invented an ingenious and complicated machine, called the spinning jenny, making possible the use of cotton thread instead of linen thread, which had hitherto been necessary. In 1769 the machine was patented and the work of building mills was begun. Arkwright was knighted by George III in 1786. See COTTON, MANUFACTURE OF.

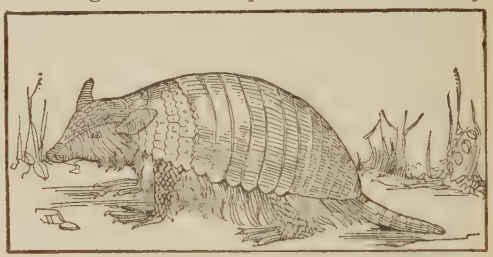
Arlington National Cemetery, one of the most beautiful places of burial in the United States, at Arlington, Va. About 18,500 soldiers and sailors of the War of Secession and the Spanish-American War, including a number of high military rank, lie in graves surrounding the fine colonial mansion which was once Robert E. Lee's home, but which was seized by Federal troops during the War of Secession. Headstones and monuments in Arlington cemetery can be seen from the Washington Monument and other elevated spots in Washington, D. C., which lies just across the Potomac River.

The village of Arlington is five miles northwest of Alexandria and three miles from Washington. It can be reached from those cities by electric railway, but tourists unacquainted with this fact pay two dollars for the trip by automobile.

Arlington, Mass., a town of Middlesex Co., 6 m. n.w. of Boston, of which city it is a residential suburb, on the Boston & Maine Railroad. The leading industries include ice cutting, ice-tool manufacturing and market gardening. Arlington Heights, a village included in the town of Arlington, is situated on a hill which commands a fine view. There is electric-car service to Boston. The Robbins Library is located here. The town was incorporated as West Cambridge in 1807 and received its present name in 1867. Population in 1920, U. S. Census, 18,665.

Armada, Spanish. See SPANISH ARMADA, THE.

Ar"madil'lo, a family of burrowing animals of South America, distinguished chiefly by their bony armor. The different species are very dissimilar in characteristics but all have many short teeth and powerful claws. The protective covering is made up of several horny



ARMADILLO

plates between bands of which the long, coarse hair protrudes. When terrified the armadillo curls up within this armor, forming a hard-shelled ball that presents no opening for attack. The limbs of the armadillo are short, the head pointed and drooping, the tail long and stiff. The giant armadillo, or peludo, and the apar, or three-banded armadillo, are the best-known species.

Ar'mature. See MAGNET.

Arme'nia, a table-land of western Asia, stretching southeast from the Caucasus range and the highlands of Asia Minor towards the lowlands of Mesopotamia and the Caspian Sea. The total area of the principal portion is about 70,000 sq. m. and it was a possession of Turkey; Russian Armenia embraced the governments of Tiflis, Erivan and Yelizavetpol and the Province of Kars; Persian Armenia includes a part of the Province of Azerbaijan. Numerous mountain ranges and plateaus cover the surface,

and high peaks (including Mt. Ararat) rise to lofty altitudes. The principal rivers of Armenia are the Euphrates, Kur and Aras; the largest lakes are Urumiah, Van and Goktcha. There are large areas of pasture land whose vegetation is scant, due to inefficient irrigation; though the temperature is unsteady the climate is on the whole very healthful. Among the products of the country are wheat, cotton, flax, tobacco and various kinds of Southern fruits; where the rainfall is sufficient, the fertile soil yields rich returns. The leading mineral supply consists of iron, copper, marble, lead, gold, quicksilver, marble and saltpeter.

Armenia is the ancient prototype of Poland. Two thousand years ago, it was a great nation, extending from the Black Sea and the Caucasian Mountains to Persia and Syria. At the time of its greatest extent, it had an area of nearly 500,000 square miles. That territory was studded with flourishing cities, whose ruins still attest a high civilization. It was tilled by an industrious people, worthy representatives of the Aryan family of races.

For fourteen centuries, Armenia enjoyed independence. Then for over four centuries she was an autonomous state under the suzerainty of Turkey. In 1451, Turkey annexed over 100,000 square miles of Armenian territory and treated it as a conquered province. In after years, Persia and Russia completed the division of the old kingdom. The part taken by Russia—Trans-Caucasia—was the cradle land of the Armenian race. There is situated the religious capital of Armenia, the city of Etchmaidzin. There is still standing the cathedral built more than eight centuries ago; and there the Catholicos, the head of the Gregorian church, still extends his spiritual authority over his scattered people.

Poland has risen to new life, will that be true of Armenia? At present their land is one of abject poverty and misery. Their people are scattered. The total number of Armenian people, despite the terrible massacres of recent years, is well over 4,000,000, about half of whom live within the limits of historic Armenia, the others are scattered.

Their days of abject misery are over. It is certain that in one form or another a large degree of national life is coming. It needs only the general diffusion of education and the blessings of civilized government for Armenia to become once more a prosperous and powerful state. Wherever given a chance they have displayed signal ability in business and in all branches of government. (For long centuries through terrible persecutions, Armenia stood a bulwark against the menacing spread of Islamism.)

Armin'ius (18 B. C.-about 20 A. D.), a celebrated German chief. Germany, then under Roman rule, was subjected to great oppression. Arminius organized an army in 9 A. D. and annihilated the legions of the Emperor Augustus, under Varus, in the Teutoburg Forest. It was 14 A. D. before the Romans again invaded Germany, and, though the Roman general, Germanicus, was victorious over Arminius, he was recalled in the year 17 and the fruits of victory were lost. This was the last Roman army to march north of the Rhine. Arminius is known in history as the liberator of Germany and is a familiar character in song and story.

Armor, a protection for the body of a warrior in battle. Some kind of protection against weapons is coeval with weapons themselves. The principal pieces of armor were the shield, helmet, breastplate, or cuirass, and greaves. Shields were once made of tough hide tightly stretched on a framework of wood, but later they were made wholly of metal. The Greek and the Roman shields were of various shapes, often sufficiently large to cover the whole body. The helmet of the Greeks was notable for its high crest; that of the Romans fitted the head more closely. The helmets of all nations provided protection for the head and neck, with movable pieces for the protection of the face. The breastplate, or cuirass, was a covering for the breast, often extending from the neck to the waist, and frequently protecting

the back also, being in the form of a doublet put on over the head. Greaves were a protection for the legs.

Great modifications in the form and material of armor took place with the progress of civilization. The Anglo-Saxons used leather for their shields, and their coats of mail were strengthened by rings. Metal was used in Europe from the 10th to the 18th centuries, the earlier chain mail being made by interlinking rings. In scale armor small pieces of metal were used instead of rings; and in plate armor still larger pieces of metal were fastened together. Many improvements were made, especially in the flexibility of armor, until, in the time of Henry VIII of England, a complete suit covering the whole body and yielding to every movement, was worn. Suits were also provided for the horses, so that a fully-equipped knight was almost invulnerable to the weapons of that day. Since the introduction of firearms such protection has become useless, and suits of mail are to be seen only in museums.

Armor Plate, a metallic covering for ships to furnish protection from gun fire. Its use was begun soon after the introduction of big guns on war vessels. Important use was first made of armor plate in operations against Gibraltar in 1782. In 1812 John Stevens of Hoboken, N. J., submitted to the United States Government plans for a vessel protected by armor plate. In 1842 Congress ordered a vessel to be built which should be proof against shot and shell. Since that time such marvelous efficiency has been secured in projectiles that the most effective armor plate yet made cannot render a vessel shot- and shell-proof. The process of making armor plate is complicated and expensive, requiring the intricate combination of various kinds of steel and metallic composition of different degrees of hardness. The process requires several months. Improvements are being constantly made. See NAVY.

Armored Cruiser, a war vessel serving both for fighting and scouting. This vessel was in use as early as the 16th century and was called the fly's boat. The important qualities in an armored cruiser are speed, and offensive and defensive powers. It carries plate armor varying in thickness from two inches to more than one foot. This vessel is used for escorting convoys and for carrying dispatches. The United States cruiser *Colorado,* which is 502 ft. long and 70 ft. broad, and has a displacement of 15,000 tons and a speed of 23 knots an hour, is a good example of an armored cruiser. She has a belt of armor three and one-half to six inches thick and seven feet high protecting her along the water line, and carries ten six-inch rapid-fire guns in the center of her citadel, besides several guns of smaller caliber. See NAVY.

Armour Institute of Technology, at Chicago (1892), a nonsectarian institute for men, is in fact a college of engineering. Its entrance requirements are the same as those of the best American universities, and it offers four-year courses of strictly collegiate instruction leading to the degree of bachelor of science. For graduate work it confers higher degrees. The institute was founded in 1892 by Philip D. Armour, with "the desire to help those who wished to help themselves." Its college of engineering maintains courses in architecture and in mechanical, electrical, civil, chemical and fire-protection engineering. The faculty numbers about 60. Among the 700 students are representatives of nearly all the states and many foreign countries. It maintains a summer session, in which courses are offered to meet the needs of public school teachers who desire further training in applied science; but credit for all such work is given in the college of engineering. Armour Institute also maintains evening courses for those unable to attend during the day. These courses cover all college preparatory subjects. The enrollment in evening classes exceeds 700. See ARMOUR, PHILIP DANFORTH.

Armour, Philip Danforth (1832-1901), an American capitalist and philanthropist, born in New York. In 1852,

attracted by the gold craze, he went to California, but returned four years later. For a few years he engaged in business in Milwaukee, but finally removed to Chicago where, with his brother, he established the most extensive meat-packing concern in the world. He gave generously of his vast fortune to promote the interests of humanity, the most notable of his philanthropies being the founding in Chicago of the Armour Mission and the Armour Institute.

Arm'strong, Samuel Chapman (1839-1893), an American educator and missionary, born at Wailuku in the Hawaiian Islands. He was educated at Oahu College, Honolulu, and at Williams College, Mass., and served in the Civil War, becoming brigadier-general of volunteers at its close. After the war he became interested in educational pursuits, and in 1866 was associated with Gen. O. O. Howard of the Freedman's Bureau in working out a system of negro education. He was one of the founders of Hampton Normal and Agricultural Institute, an institution which has exercised a far-reaching influence upon the education of the negro.

Armstrong, Sir William George (1810-1900), an English inventor and mechanical engineer, born at Newcastle-upon-Tyne. In his youth he studied law, but at a comparatively early age turned his attention to scientific work. The hydroelectric machine for developing frictional electricity, and the hydraulic crane were among his first inventions. In 1854 Armstrong invented the rifled ordnance gun which bears his name. This gun is made of wrought iron bars coiled spirally and so constructed as to give to the projectile a rotary motion in its flight. The inventor was appointed government engineer of rifled ordnance and in 1882 was chosen president of the Institution of Civil Engineers. In recognition of his achievements the universities of Cambridge and Oxford conferred honorary degrees upon him and in 1887 he was made a peer.

Armstrong-Hopkins, Saleni (1855-), a physician and author, born in Canada. She received her degree from the Woman's Medical College of Pennsylvania in 1885, and in 1886 she went as medical missionary to India, founding a training school for nurses at Bombay the following year. In 1888 she was elected by the World's Woman's Temperance Union as national lecturer on heredity, and, having filled various other medical positions in India, returned to America in 1893, bringing with her six natives to educate. She had married Rev. George Hopkins in the same year and their joint names were later hyphenated to one of Armstrong-Hopkins. Later she lectured and preached widely. Her writings are principally of a religious trend.

Army, an organization, armed, equipped and trained for war, offensive or defensive, and acting in unison under the orders of a commanding officer. The oldest-known army was that of the Egyptian ruler, Sesostris, 1600 B. C. The Spartans developed a military system which became the nucleus of the Greek army. They organized the phalanx, which enabled the combined armies of the Grecian states to defeat the great army of the Persians under Xerxes. The Greek organization was perfected by the Romans, whose armies were the most thoroughly organized and best disciplined of any of ancient times, making the military power of Rome practically invincible for several centuries.

Medieval Armies. The fall of the Roman Empire was followed by a decline in military organization. The feudal system led to the organization of small bands of men who followed their overlords or barons, and disputes were often settled by combats between two knights, each chosen as a champion of his side (See Feudal System). The Crusades at once showed the need of better military organization, and the armies organized for the expeditions to the Holy Land formed the basis of military organizations which have continued to the present time. See Crusades.

Modern Armies. While differing in certain minor details, the armies of all

great powers are organized on practically the same plan. Not considering for the present the United States, the leading military powers are Great Britain, Germany, France, Austria-Hungary, Italy and Japan. Before the revolution of 1917, Russia was potentially a great military power, but no assertions can now be ventured in that respect.

Before the European War the various nations of Europe had each its military ideals and methods of enforcing the same. Under the stress of war, in a true sense of the word, the entire resources of the nations are mobilized for war. Figures as to military strength are therefore utterly meaningless, at present. The future will undoubtedly witness great changes in conditions existing before 1914.

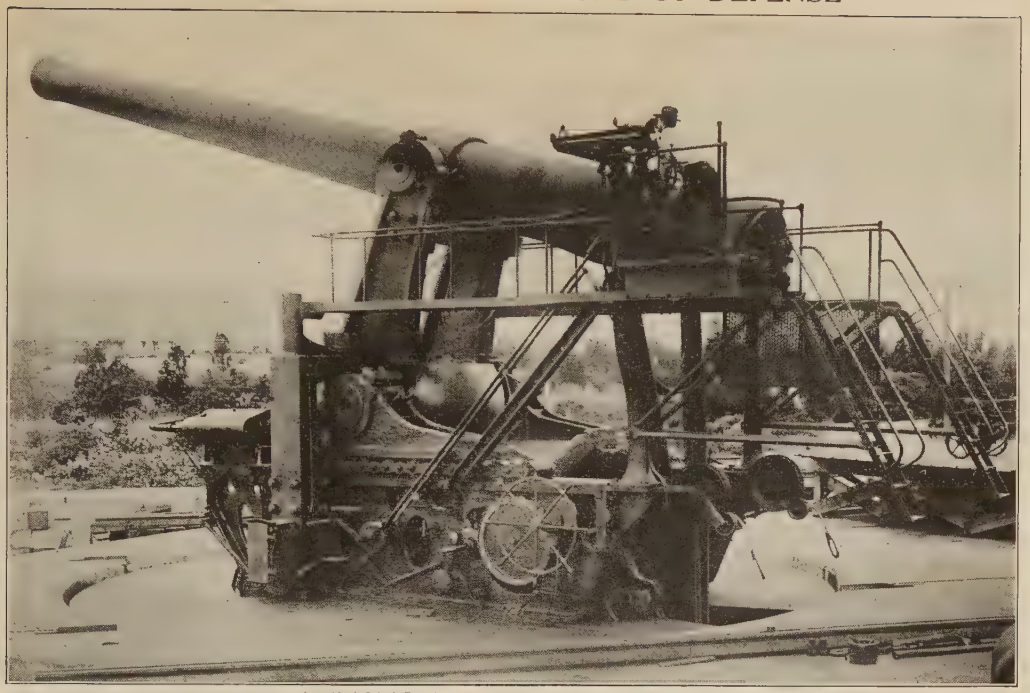
Army, United States. In the past, the policy of the United States was to keep in readiness only a small army known as the Regular Army. Its ranks were filled by enlistment. This force was under the command of United States officers. Prior to 1916, each state in the union had a force of enlisted men known as the State Militia. The force was maintained by enlistment. Each state followed its own rules concerning the establishment and management of its own troops. In 1916, the federal government assumed control of the state militia.

After we entered the European War, and so were under the necessity of raising a large army, congress authorized a selective draft. Under the provisions of that draft 9,659,382, young men between the ages of 21 and 31, inclusive, registered for service. Of this number 687,000 were selected by draft for immediate service; since then other large forces have been selected or drafted from the same registration. This force was known as the National Army. In August, of the same year, the organized militia of the several states amounting to 450,000 men was drafted into the Federal service, and was known as the National Guard.

August 7, 1918, the foregoing distinctions were abolished and the United States Army is a term including all the organized forces of the United States, irrespective of their origin. The far larger proportion has been raised by draft. The size of the army is only limited by the exigencies of the Union, since the draft age has now been fixed between 18 and 45. In the summer of 1918, plans were matured for an army of approximately five million men. Naturally these figures will not apply in times of peace, but we may expect that our country will adopt some form of universal military training in the future.

Equipment. The modern army is equipped with the most advanced scientific weapons of destruction, machine guns of marvelous mechanism; monster cannons capable of sending a ton of explosives and metal many miles through the air. It is also supplied with hand grenades of various sizes, with flame throwers, gas shells, and darts, the latter dropped from passing air craft. Gasolene has become as important as powder, since it alone makes possible the airplanes which are becoming more important every day, replacing for scouting purposes the cavalry of former days, they have become indeed aerial scout boats, frigates, and dreadnaughts of the sky. Automobiles and auto trucks of all description are alone capable of army transport needs. The army mules and wagons of earlier years are now of secondary importance. Various protective devices are supplied, such as steel helmets for the head, chest protectors for the grenade throwers, and gas masks. The hospital service now is a triumph of life saving science. Thus extremes meet in modern army equipment.

Army Organization. An army is efficient only as it is organized, drilled, and supplied with trained officers. Soldiers are united in groups formed by combining groups of inferior importance. Each successive group is under the command of an officer whose rank increases in importance as the force he commands increases in number and strength. The following outline will help to understand the present organization:



A PANAMA CANAL WATCH DOG

Mounted at each end of the waterway these guns will command a range of 20 miles. This weapon is technically known as a twelve-inch disappearing gun. It is so large that a man could easily crawl into the muzzle and yet its mechanism is so delicate that it responds readily to the control of the man you see sighting it.

ONE OF UNCLE SAM'S SMALLER ARTILLERY PIECES!

Just before firing a 4.7 inch semi-automatic rapid-fire gun. Ten of the huge projectiles such as the marine holds are hurled from this weapon.

Units		Combined in	Commanded by	Remarks
1.	Soldiers	Squads	Corporals	8 men in a squad
2.	Squads	Platoons	Lieutenants or Sergeants	The number of squads varies.
3.	Platoons	Companies	Captains	
4.	Companies	Battalions	Majors	
5.	Battalions	Regiments	Colonels	Lieutenant Colonel 2nd in command.
6.	Regiments	Brigades	Brigadier Generals	
7.	Brigades	Divisions	Major Generals	
8.	Divisions	Army Corps	Lieutenant Generals	
9.	Army Corps	The Field Army	Commanding General	

The fighting strength of the above forces varies in the different arms of the service. To illustrate from the company. It varies in strength from 250 men in the infantry company to 75 men in the signal corps. In the cavalry the company is known as a troop, and a battalion as a squadron. In the field artillery the company is known as the battery; instead of squads, we have sections. In the aviation section of the signal corps, we have wings, squadrons, battalions and companies.

Non-commissioned Officers. Non-commissioned officers are privates appointed (not commissioned) to command small detachments of troops and perform minor duties. There are two classes, Sergeants and Corporals. Corporals are squad leaders. In each infantry company there are 11 corporals. In an infantry company there is one first sergeant, one mess sergeant, one supply sergeant, and six sergeants.

The division is the real fighting unit. It forms a whole by itself. It is composed of all the different arms in the proportion that have been deemed necessary to the efficiency of the whole army. The strength of an army is always given in terms of divisions.

An army is intended to enforce the will of a nation or to defend its rights, therefore the supreme command rests in the executive power or the head of the state, consequently the president is the Commander-in-Chief of the Army.

But to advise the president and his secretary, there has been instituted a General Staff. It is composed of officers detailed to study every question pertaining to war.

The War Department. For purposes of administration this department is subdivided as follows: The military secretary's department, which has charge of orders, records and correspondence; the inspector-general's department, the duties of which are to investigate every department of military affairs; the judge advocate-general's department, which is the legal department having charge of all records of courtsmartial, commissions, titles to land held by the war department, etc.; the quartermaster's department, which provides transportation of troops and war supplies, horses, mules, wagons, fodder, provisions, munitions, tents, officers' quarters, etc., covering everything that must be transported; the subsistence department, which supplies the necessities of life to those entitled to them and offers them for sale to those who are expected to pay for them; the finance department, which has charge of the funds and pays the army; the medical department, which has charge of sanitation, surgery and medicine; the corps of engineers, which has charge of all engineering matters in the field in time of war, and also of garrisons; the ordnance department, which buys or manufactures all guns and supplies and furnishes them to the army; the signal corps, which has charge of all signaling and signal apparatus; and chaplains, who have charge of the religious affairs of the army, but not in a sectarian sense.

Military Departments. The United States is divided into the following military departments: Department of the East, headquarters, Long Island, New York harbor; Department of the Lakes,

headquarters, Chicago; Department of the Gulf, headquarters, Atlanta, Ga.; Department of Dakota, headquarters, St. Paul; Department of the Missouri, headquarters, Omaha; Department of the Colorado, headquarters, Denver; Department of the Columbia, headquarters, Vancouver's Barracks, Washington; Department of California, headquarters, San Francisco. The Hawaiian Islands are included in the Department of California; the Island of Porto Rico constitutes the Department of Porto Rico, headquarters, San Juan. The Philippine Islands constitute the Department of the Pacific, with headquarters at Manila.

Army Worm, a destructive, striped caterpillar which in the adult stage becomes a yellowish moth and is a member of the Noctuid Family. These caterpillars take their name from their habit of marching in long, regular columns from field to field. Army worms are exceedingly destructive of grains and grasses. The moth lays its eggs in a long string in the sheathing stems of the grass, and the caterpillars all hatch about the same time. After a few weeks they crawl into the ground and go into the chrysalid state, from whence they emerge as moths. Plowing a deep furrow about the field prevents their entrance as caterpillars, but, of course, does not destroy them nor hinder the moth from laying her eggs within. See INSECTICIDE.

Arndt, Ernst Moritz (1769-1860), a German patriot and poet. In 1806 he was appointed professor of history at the University of Greifswald, and in 1818 professor of modern history in the University of Bonn. His insistent demands for reform led to his retirement, and he devoted himself to literary work until 1840, when he was reinstated in the university. His patriotic songs are still popular in Germany, and are sung on all occasions. Among them are *Where is the German Fatherland? What Does the Trumpet Cry?* and *Come Out, Hussars!*

Ar'nica, a somewhat coarse herb of the Composite Family growing chiefly in western United States. The plant has slender, opposite leaves and heads of yellow flowers. The roots of many species are the source of the drug, arnica, which as tincture of arnica is used as a stimulant and for rubbing upon bruises, sprains and swellings. The arnica plant is also called wolfsbane and mountain tobacco.

Ar'no, a river of Italy, rising in the Etruscan Apennines 4265 ft. above sea level. It runs first southeast and then west through several famous mountain gorges and then through the beautiful Val d'Arno. The cities of Florence and Pisa are located upon its banks and seven and one-half miles west of the latter the river flows into the sea. The Arno is 155 m. long and is navigable to the city of Florence, although sudden floods made great caution necessary. Fossils of many prehistoric animals and bones of those now common only in the North, as deer, bears, etc., are commonly exhumed from the banks.

Ar'nold, Benedict (1741-1801), an American general, born at Norwich, Conn. At the age of 15 he ran away from home and enlisted in an expedition against the French, but soon deserted. In 1762 he became proprietor of a drug and book store in New Haven, and subsequently engaged successfully in trade with the West Indies. Immediately after the Battle of Lexington he led the local militia, of which he was captain, to Cambridge. At his suggestion he then undertook an expedition against Crown Point and Ticonderoga, but on the way met a similar expedition from Vermont, in charge of Ethan Allen, who took command of the joint forces. Arnold accompanied him as a volunteer, however, and rendered valuable assistance in the capture of Ticonderoga. Four days later he himself captured St. Johns. In the fall of 1775 he led an expedition by way of the Kennebec and Chaudière rivers to assist in the siege of Quebec, and was severely wounded in the unsuccessful assault upon that city. For his gallant services in this campaign he was made brigadier-general. He constructed a flotilla and in October, 1776, checked the advance of the enemy on Lake Champlain, making possible the dispatch of

3,000 men from the Northern army to assist Washington at Trenton and Princeton.

In 1777 Congress promoted five of Arnold's juniors to be major-generals over his head, and he was greatly incensed at this action. Upon Washington's earnest persuasion, however, he continued to serve; and Congress made him major-general after his gallant attack at Ridgefield later in the year, and finally restored him to his relative rank after his brilliant services at Ft. Stanwix and the second Battle of Saratoga. In 1778 Washington appointed Arnold to the command of Philadelphia, where he came into conflict with the civil authorities and was subjected to a court-martial upon trivial charges. Meanwhile he had married a prominent Tory lady of Philadelphia, had been thrown much into the society of Loyalists, and had become involved in debt by extravagant living.

He secured command of West Point and opened negotiations with Sir Henry Clinton in New York with a view to its betrayal into his hands. The capture of André, Clinton's adjutant, to whom the completion of details was intrusted, frustrated the plot, and Arnold escaped to the British lines. After conducting a British expedition into Virginia against Richmond and another into Connecticut against New London, he went to London in 1781; but, embittered by the neglect and scorn with which he was met, he returned to Canada and engaged again in the West India trade from 1787 to 1791, when he went once more to London. Here he died ten years later.

Arnold, Sir Edwin (1832-1904), an English poet and journalist, born at Gravesend. He was principal of the government Sanskrit College at Poona, India, and rendered valuable service to his country during the Indian Mutiny of 1857. The "Cape-to-Cairo Railway" is said first to have been conceived by him and he arranged for Stanley's expedition to Africa. His fame rests chiefly on the Indian epic, *The Light of Asia,* a work characterized by lofty philosophy and vivid portrayal of Hindu scenery, climate and people. He also published *The Light of the World, Indian Songs of India, Pearls of the Faith and Japonica.*

Arnold, Matthew (1822-1888), an English poet and essayist, son of Dr. Thomas Arnold, the famous head master of Rugby. He was born at Laleham, a village in the Valley of the Thames. Arnold was educated at Winchester and Rugby, and at Oxford. In 1847 he became private secretary to the Marquis of Lansdowne, who appointed him inspector of schools in 1851, a position which he held for 35 years. From 1857 to 1867 he was professor of poetry at Oxford, and during this period began an important reform in English criticism. He was commissioned at different intervals to visit the Continent for the purpose of studying educational methods, and twice visited the United States.

Arnold was distinguished as a poet and as a critic. The bulk of his verse is small, but it is almost uniformly of a high order, and in character, is grave and noble, touched with a wistful melancholy. His prose is less somber in tone than his poetry. Believing that culture was the saving grace in religion, politics, education and literature, he earnestly preached the value of open-mindedness and willingness to study new points of view. His prose style is brilliantly clear and polished, and his influence is still potent in English criticism. His best-known works are *Essays in Criticism, Culture and Anarchy, On Translating Homer, On the Study of Celtic Literature;* and the poems *Sohrab and Rustum, The Scholar Gypsy* and *Thyrsis.*

Arnold, Thomas (1795-1842), a distinguished English scholar, clergyman and educator, born at West Cowes, Isle of Wight. Four years after graduation from Oxford he was ordained a deacon, and later became an instructor of young men at Laleham. He became head master of Rugby in 1827. During the 14 years of his administration of this school he exercised a tremendous influence upon the educational system of England. His aim was to develop character, and the methods he employed to accomplish his

results revolutionized discipline and instruction throughout the public schools of England. He was not a great scholar, but his success lay largely in the indirect influence of his exemplary life and in the high ideals and lofty principles which he inculcated. His life story is related by Dean Stanley in *The Life and Correspondence of Arnold* and in *Tom Brown's School Days* by Thomas Hughes.

Ar'row, a weapon of offense consisting of a straight-pointed shaft, usually with a feathered tail. In the earliest stages of savagery, the arrow, the javelin and the spear were considered the same, but with the development of the art of war the use of the arrow was confined to the bow and crossbow. The bow and arrow constituted the American Indians' chief weapon of the chase when they were discovered, and in its use they were very skillful. The Indians made their arrowheads of stone, usually of some variety of flint.

Ar'rowroot", a starchy food of varying chemical properties derived from the roots of any of a number of tropical trees. Probably the chief sources in the United States are a small tree of the Ginger Family, which has a long rootstock, peculiarly sheathed stems and pairs of irregular leaves, from between which grow the angled, tubular flowers; and the coontie, a tree of the Cycad Family, whose trunk is entirely underground. Arrowroot is highly nutritious and is used as a food for infants and invalids.

Ar'senal, a government plant for the manufacture, storage and issuing of arms and munitions of war. There are arsenals in the United States at Watertown, Mass.; Watervliet, N. Y.; Springfield, Mass.; Rock Island, Ill.; the Proving Ground at Sandy Hook, N. J.; Dover, N. J., and elsewhere. In England there is a great arsenal at Woolwich, and naval arsenals at Portsmouth and Plymouth. In the United States the naval arsenals are called navy yards (See NAVY YARD). The term *arsenal* is also used sometimes of storehouses having no manufacturing establishment connected with them.

Ar'senic, a widely distributed element, though not found in large quantities. It occurs in combination with iron, silver, cobalt, nickel and antimony, in Siberia, Germany, Chile, Japan and the United States.

Pure arsenic differs in appearance according to the method by which it has been prepared, but it always burns with a blue flame and a strong, offensive odor. Arsenic forms one of the chief impurities of iron, but, because it can be highly polished, is often used with iron to make small chains. With copper it is a constituent of metallic buttons. It was once much used in coloring candy and wall papers, but its poisonous qualities were considered so dangerous that as a coloring pigment it is now used mainly in the arts. In small quantities arsenic itself is not poisonous and is a constituent of some medicines. Many of its compounds, however, are highly poisonous, notably white arsenic, or the arsenic of commerce, and Paris green. An antidote for arsenic poisoning is the white of an egg and water or small doses of magnesia and water given every 15 minutes for several hours. See POISON.

Ar'son, the malicious burning of a dwelling, outhouse or other building belonging to another person, or the malicious burning of any public building. Formerly in England arson was punished by death, but now in both England and the United States the punishment is imprisonment, the length of the term varying in different states and according to circumstances. If a person loses his life in the burning building, the crime may be classed as murder.

Art. See FINE ARTS; ORIENTAL ART; ARCHITECTURE; PAINTING; SCULPTURE.

Ar"taxerx'es, the name of several Persian kings, of whom the most important was the Artaxerxes surnamed Mnemon, who succeeded Darius II in 404 B. C. His brother, Cyrus the Younger, aided by the Spartans, rebelled against him and fell at the Battle of Cunaxa. Artaxerxes made war upon the Spartans for assisting his brother, and forced them to abandon the Greek cities of Asia

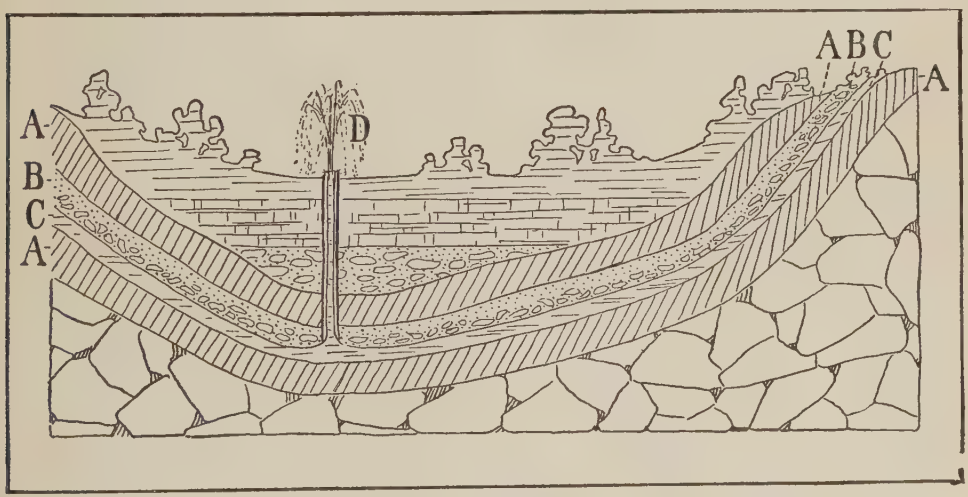
Minor. The Battle of Cunaxa is described in Xenophon's *Anabasis*.

Artemisia, *Ar"te mish' i a,* or **Wormwood,** a bitter, aromatic herb of the Composite Family from which a stimulating tonic is obtained. The plant grows in the United States, south and west from Minnesota, and is often called pasture sagebrush, wild sage or wormwood sage, The tops and leaves of one species are used by the French for making absinthe. See ABSINTHE.

Ar'temus Ward. See BROWNE, CHARLES FARRAR.

Ar'teries, in anatomy, the sytem of pipes or tubes, by means of which the blood is conveyed from the heart to all parts of the body. The aorta is the principal and largest artery. Starting from the heart it extends upward, then downward, forming an arch. In the region of the abdomen it separates into two branches, the right and the left iliac arteries, which continue into the lower limbs as the right and left femoral arteries. From these spring other branches, which form a network throughout the lower extremities. Springing from the arch of the aorta and passing to the shoulders are the right and left subclavian arteries, of which the brachial arteries of the arms are continuations. The two carotid arteries nourish the head; the coronary artery traverses the outer sac of the heart. The pulmonary artery is a large artery which springs from the heart and penetrates the lungs. The walls of the larger arteries are made up of six successive layers of fibrous, muscular and membranous substance, but these layers decrease in number as the tubes decrease in size and capacity, until only a thin coating remains to cover the smallest branches. The function of the arteries is to carry the blood to every part of the body, which they do by separating again and again into a multitude of tubes, which grow smaller with each successive branching until they constitute an intricate network of tiny tubes called capillaries. The capillaries unite to form veins, whose function is to carry the blood back to the heart. See VEINS; CIRCULATION; HEART.

Artesian, *Ar te' zhan,* **Well,** a well formed by boring or drilling (See WELL BORING) and so named from the Province of Artois, France, where these wells were first successfully used. Some artesian wells are "spouters," or flowing



ARTESIAN WELL

wells, but the water is obtained from most of them by pumping. In all, the water rises some distance in the tube. The generally accepted theory of artesian wells is as follows, and is illustrated in the cut. *AA* are two layers of rock

through which water cannot pass. Between them are layers of gravel and sand, *BC*, which extend to the surface and in time become saturated with water. If a well, *D*, is sunk to this layer, the water will tend to rise until it reaches the highest level in *BC*. If this point is far enough above the surface at *D*, the well will flow, otherwise the water must be pumped. Allowance must be made for friction, and the actual height to which the water will rise is less than the theory might lead one to expect. Another theory for the rise of the water is that it is forced up by the pressure of gases in the earth. Many artesian wells are shallow, extending less than 50 ft. below the surface, but those most constant in their flow are driven to a greater depth, some extending from 1500 to 2000 ft. Artesian wells constitute an important source of water supply in arid and semiarid regions, and in some localities they supply water for irrigation. See IRRIGATION.

Arthrop'oda, one of the largest divisions of the animal kingdom. It includes those animals which are distinguished by having segmented bodies and many externally-jointed limbs. The various segments of the body are fitted for different functions and are governed by a well-organized nervous system whose central ganglion is located at the front of the body and may be called a brain. The appendages of the body are arranged in pairs, although one of the pair is often rudimentary and one pair is generally modified to assist in holding and crushing the food; other pairs form long, tactile antennæ, or feelers, and still others are the animal's means of locomotion. The subclasses under this division include the Crustacea, Myriapoda, Insecta and Arachnida, all of which are described under their respective titles.

The old title, Articulata, once given to this class, fell into disrepute when many of the groups once placed among the Articulata were made into separate classes. At present, however, the tendency is to return to practically the same classification as first used, but the name Arthropoda is retained. See ZOOLOGY, subhead *Classification*.

Arthur, Chester Alan (1830-1886), the twenty-first president of the United States, was born at Fairfield, Vt., of Scotch-Irish parents. He graduated from Union College in 1848, taught school, studied law, was admitted to the bar in 1853, and began practice in New York City. He met with increasing success in his profession, and was one of the counsel in the famous Lemmon case, in which it was decided that negro slaves brought into free territory by their masters became free; and in the Jennings case, in which negroes were given equal rights with the whites in riding in New York street cars. In 1861 Arthur was appointed engineer-in-chief on the governor's staff, with the rank of brigadier-general; in 1862 he became inspector-general of New York troops; and later in the year he was made quartermaster-general. In this capacity he was energetic and efficient in raising and equipping troops for the front.

Arthur early became interested in politics, although with no personal desire to hold office. In 1871 he was appointed by General Grant collector of the port of New York, a position which he held until 1878. He identified himself with the Conkling, or "Stalwart," faction of New York, and as a concession to this faction was nominated for vice-president in the Republican convention of 1880, which nominated Garfield for the presidency. Upon the death of Garfield in September, 1881, by the assassin's bullet, Arthur became president. Immediately his partisanship ceased, and he performed the duties of his high office with such conservative wisdom and ability as to meet general approval. His administration was characterized by national peace and prosperity. Its chief events were the appointment and report of a tariff commission, the limiting of Chinese immigration, the abolition of polygamy in Utah and the adoption of civil service reform. Arthur was a candidate for renomination before the Republican convention of 1884, but James G. Blaine was chosen.

The convention, however, commended the "wise, conservative and patriotic policy" that had characterized the administration of President Arthur. See Study Guides.

Arthur, King, the central hero of a group of stories which originated during the Anglo-Saxon invasions of Britain. Arthur is represented as a mighty monarch who ruled over Britain in the sixth century and was the defender of his people against the barbarian invaders. He married a beautiful princess named Guinevere and lived in great splendor in Wales. Twelve of his bravest knights sat with the King at a round table. These were the famous knights of the Round Table who figure so largely in English literature. After the King had conquered the Saxons he reigned in peace for 20 years. He was grievously wounded in an attempt to put down a revolt headed by his nephew Modred. Undoubtedly these stories have a historic basis, but so much of myth and fancy has been woven into them, that they must be considered a part of traditional literature. The legends of Arthur were put into writing 1000 years ago by Nennius, a British historian of the ninth century, who wrote in Latin a history of the Britons, in which he gave an account of the wars of Arthur. About 300 years later, Geoffrey of Monmouth, a Welsh priest at the court of Henry I, related the tales in Latin prose, adding stories of his own invention. They were next put into French verse, found their way into France and came back to England about 1155 as the work of a Norman poet named Wace. About 1205, Layamon, the first writer of romance in English after the Norman Conquest, put the stories into his poem *Brut*. He introduced new stories, among the most notable being that of the founding of the Round Table. After this there were several versions in English verse, and a noteworthy prose account by Sir Thomas Malory appears in the 15th century. The legends form a remarkably large part of the poetry and prose of medieval and modern literature, but have been most beautifully treated by Tennyson in his *Idylls of the King*.

Ar'tichoke, a name applied to two widely differing members of the Composite Family, the garden artichoke and the Jerusalem artichoke. The former is probably the more familiar through its use as an article of food. As its name implies it is a garden herb; the leaves are coarse and deeply-divided, resembling those of the thistle, to which it is closely related. The flowers are borne in a compact head surrounded by rows of stiff, pointed, scaly leaves called an involucre. The lower part of this involucre and the upper portion of the flower stalk are the parts eaten. They are cooked as a vegetable or used in salads. The flower stems are two to three feet high and the individual flowers are purple or white in color. This artichoke is a native of the Old World.

The Jerusalem artichoke is native in the United States and bears a resemblance to the sunflowers. It is a roadside or meadow plant now sometimes cultivated for the sake of its edible tubers. The stem is coarse and hairy, often six to ten feet in height, and bears wide, short-stemmed, vertically-spread leaves which are somewhat narrower than those of the sunflower. The flowers, which are yellow in color, are on flattened disks surrounded by broad, yellow rays which resemble petals. The tubers, which are borne closely about the fleshy root, are produced in great quantities by one plant; in form they are somewhat pear-shaped and in color may be purple, red, yellow or white. The chief use of the Jerusalem artichoke is for fodder. As a wayside-blooming plant it lends brightness to the autumn landscape and renders there no small service. The name Jerusalem, applied to this herb, is a corruption of the Italian word *girasole,* meaning sunflower.

Articles of Confederation. See CONFEDERATION, ARTICLES OF.

Articles, The Thirty-nine, a statement of the 39 special doctrinal points maintained by the English Church. The original articles were 42 in number and

were drawn up by a commission of eight bishops, eight clergymen, eight civilians and eight lawyers, in the reign of Edward VI. They were published in 1553. Under Queen Elizabeth they were revised by Archbishop Parker (1563) and reduced to 39. The Episcopalian churches of Scotland, Ireland and America have accepted this formula of the Church.

Artic"ula'ta. See ARTHROPODA.

Artificial Limbs, the name given to those mechanical contrivances which are employed to fill the functions of the lost limb. No doubt the substitution of some crude form of appliance to replace a lost limb dates back to ancient times. We have evidence of their existence 300 B. C. Artificial limbs, as now constructed, show much ingenuity, and the use of aluminum and papier-mâché in their construction renders them strong, light and durable. In artificial legs the movements of the knee and ankle joints, and in artificial arms and hands the movements of the elbow joint, and of devices for holding knives, forks and other articles, bear close resemblance to the movements of the natural limbs.

Artillery, that branch of the army which uses large mounted guns or cannon, also the ordnance or guns. The Seacoast artillery uses the heaviest guns as they are mounted on the sea front and need not often be moved. Siege artillery uses smaller guns of a size and character that can be more readily handled. The field artillery is equipped for more rapid movement. The particular kind of gun that is of most value in battle is the comparatively light, quick firing variety that can be drawn by a few horses or a motor and requires but few men in its actual operation. So called light artillery is easily concealed in screened positions, in forests or by a covering of branches. Often these guns are painted in the colors of their surroundings, this means of deception is called camouflage.

The gun for which was claimed the greatest destructiveness in the World War was the French "75." It fires a shell 2.9 inches in diameter, weighing from 12 to 15 pounds, has a range of three or four miles, and can be fired with great rapidity. American and British guns of similar caliber are nearly as effctive. The Germans and Austrians relied largely upon such guns, but placed even more reliance upon larger weapons stationed from five to ten miles back of the battle lines and from these comparatively safe positions hurling huge explosive shells of ten to sixteen inches in diameter. In the early stages of the World War the Germans made effective use, in the capture of Liege and other strongholds, of a large gun of Austrian manufacture which quickly reduced to ruins what was considered an impregnable fort.

In 1918, the Germans shelled Paris with a "supergun" which had a range of seventy-six miles. These weapons were between 90 and 100 feet in length, and their projectiles weighed about a ton. The shell in its journey soared fifteen miles above the earth and made the distance in three minutes.

For aircraft the favorite weapon is the machine gun, although light 2-inch rapid firers, specially mounted so that they could be fired at a high altitude, were used in late months of the World War.

A'rum, a widely scattered family of plants, many peculiar members of which are found in the tropics. They are usually herbs with fleshy rootstock, broad, arrowlike leaves and tiny flowers clustered at the base of a stalk, called the spadix, and generally shielded by a graceful leafy covering called the spathe. The fruit is a cluster of berries. The arums of temperate climes are best represented by the welcome Jack-in-the-pulpit, the wood-loving green dragon or dragon arum, the swamp-inhabiting arrow and water arums, the tall golden club and sweet flag and the odorous but handsome skunk cabbage. The most numerous and the most grotesque arums are those of the tropics, which are frequently gigantic plants in the heart of the jungle, but may be great air plants in the highest branches of other trees. One of the most peculiar is a huge herb of Sumatra, which grows to a height of six or eight

feet and has a fleshy spadix nearly two yards long. The so-called calla lily is a tropical arum cultivated in conservatories for its pure white waxy spathe, which has probably caused it to be named

ARUM

lily. Water arum is said to be poisonous, while the root of the sweet flag is the source of a stimulating medicine. See JACK-IN-THE-PULPIT; CALLA.

Aruwimi, *Ar"oo we'me,* a large river of central Africa constituting the chief tributary of the Congo. It rises west of Lake Albert Nyanza and flows westward. Its length is about 800 m. and it is navigable as far as Jambuja. Its course is through a dense forest and it has numerous rapids. Stanley ascended the Aruwimi in 1887 and gives a good description of it in his *Darkest Africa.*

Ar'yan, a name applied to the Indo-Europeans. The Aryans were thought to have lived originally in central Asia and along the steppes of southern Russia. From there they descended to northern India and migrated west to Europe. The use of the term is now generally restricted to the people who used the Sanskrit language. The Indo-European, or Aryan, family broke up, and the word *Aryan* is now no longer applied to anything but the language.

As"afet'ida, a stout herb of the Parsley Family from which exudes a dark-colored gum resin also known as asafetida. The drug is sold on the market in small drops, which have an extremely disagreeable odor. It is used by physicians as a stimulant and as a remedy for spasms and was formerly worn as a preventive of disease. The leaves have a biting taste and are used in Europe for making salad.

Asbes'tos, a fibrous variety of serpentine composed of separate fibers having a silky luster. Asbestos has been known and used for ages. Its fireproof quality was known to the Egyptians. Being incombustible, its uses are many and varied. When ground fine, asbestos forms with colors and oil a paint. It is used in roofing, in covering steam and hot-blast pipes and fire-heated surfaces, and as a packing for pistons and valve stems in steam engines and steam pumps. It is woven into cloth and used in theater curtains. Asbestos paper is largely used in filtering acids, as it is not affected by them. It is employed also as an electrical insulator (See ELECTRICITY). It is found as a mineral in Montana, Georgia and in Canada. Mountain wood, mountain cork, mountain leather, fossil papers and fossil flax are varieties of asbestos. The greatest supply of asbestos is obtained from mines in Thetford, Province of Quebec.

Asbjörnsen, *Ahs byurn'sen,* **Peter Christen** (1812-1885), a Norwegian naturalist and collector of folk lore, born in Christiania. By profession a zoologist, he made the acquaintance of Jörgen Moe in 1834, and in 1842 they began the publication of their joint work, *Norwegian*

Popular Stories. Three years later Asbjörnsen alone published a collection of fairy tales. He was appointed forest master of Norway, traveled on the Continent to study different methods of forest preservation, made important discoveries in deep-sea soundings and wrote on scientific subjects, but the originality and literary talent displayed in his work in folk lore make this his most important achievement.

Asbury, Francis (1746-1816), one of the first bishops of the Methodist Episcopal Church. He was born near Birmingham, England, at 18 became a local preacher, and, having been received into the itinerant ministry, reached Philadelphia as a missionary in October, 1771. The following year Wesley appointed him general assistant in charge of the work in America. In 1784 he and Thomas Coke were elected joint superintendents of the Church in America by the conference at Baltimore which marks the beginning of the Methodist Episcopal Church of the United States. The title bishop was substituted in 1787.

Asbury Park, N. J., a city and noted summer resort of Monmouth Co., about 60 m. s. of New York City and 6 m. s. of Long Branch, on the Atlantic Ocean and on the Pennsylvania and the Central of New Jersey railroads. It adjoins Ocean Grove on the north, being separated from it by Wesley Lake. Asbury Park, named for Francis Asbury, one of the first American bishops of the Methodist Church, contains many beautiful pavilions, a large auditorium, fine bathing beaches and many summer hotels and residences. A broad board-walk extends for a mile along the beach. Wesley Lake, Sunset Lake and Deal Lake, all fresh-water lakes, are attractive for sailing and boating. Asbury Park was founded in 1869, incorporated in 1874 and chartered as a city in 1897. Population in 1920, U. S. census, 12,400.

Ascension, *A sen' shun,* a volcanic island in the Atlantic Ocean, 700 m. n.w. of the Island of St. Helena. Its area is 35 sq. m., of which about one-half is under cultivation. Green Mountain, on which is located a sanitarium for sailors, has a height of 2870 ft. The island is used as a coal depot and victualizing station for ships. It was discovered in 1501 and rediscovered in 1508 on Ascension Day. The English made a settlement here 1815 while Napoleon was in captivity on St. Helena.

Ascham, *As' kam,* **Roger** (1515-1568), an English scholar and teacher who lived during the reigns of Henry VIII, Mary and Elizabeth. He was educated at Oxford, was the teacher of Princess Elizabeth, and Latin secretary of both Mary and Elizabeth. The two essays by which he is best known, *Toxophilus* (1545) and *The Schoolmaster* (1570), represent the interest of the Renaissance movement in the progress of the individual by means of education and culture. The latter, published after his death, sets forth the idea, now generally accepted, that learning is most valuable because of the discipline it furnishes. Ascham also believed that the welfare of the nation was largely dependent on the proper bringing up of the child. Though he was a famous Latin scholar, his works are written in clear, vigorous English.

As'cher, Isidore Gordon (1835-), a poet and novelist, born in Glasgow, Scotland, of Jewish descent. He came to Canada in 1841 and studied law at McGill University, contributing to the local press and, in 1863, publishing *Voices from the Hearth, and Other Poems.* After returning to England, in 1864, he wrote frequent stories, poems and editorials. His sonnet *Canada* is considered a masterpiece. Others of his works have been *A Cure for a Title, The Devil's Doll* and a comedietta, *Circumstances Alter Cases.*

As'gard, in Scandinavian myths, the home of the gods, corresponding to the Olympus of the Greeks. It stood on the highest and middle part of Ida's Plain, which was the center of the universe. There the gods had built a hall which contained seats for 12, a high seat for Odin and a lofty dwelling for the goddess, and there they worked and played in great enjoyment, till three maidens

from the giants' land appeared. Then corruption entered. Of the many mansions of Asgard, Gimli, brighter than the sun, will endure when the rest of the universe has been destroyed by fire. It will be the home of brave and honorable men.

Ash, a tree, or occasionally a shrub, of the Olive Family, of which some 40 genera are known in the United States. In general, they have straight, cylindrical trunks, crowned with stout, regular branches thick with leaves in summer, and in winter recognizable by a gray, furrowed bark which, in one species, the blue ash, is a succession of scaly plates as shaggy as the hickory. The leaves are made up of several pairs of leaflets, with one odd one at the summit. Each leaflet is pointed, stemless, finely-toothed and prominently veined; in color they are pale underneath, but darker green above. The flowers are without calyx and corolla and develop a dry, winged fruit; in most ashes, the wing completely surrounds the fruit, but in the white ash, the most abundant species, the wing is terminal and extends to a length equal to that of the enveloped seed. On the winter branches the terminal bud is much larger than the lateral buds, which appear in pairs, alternating in position along the branch.

The ash is one of the most valuable hardwood trees of American woods. The different species furnish lumber for furniture, barrels, interior finishing, flooring, handles of tools and agricultural implements, and cars; the ash burls, or excrescences from the trunk of the black ash, produce a veneer; and the softened bark of the blue ash is the foundation of a blue dye; the bark of other ashes is used in fever remedies.

The ash is found in all parts of the United States east of North Dakota, and varies in height from 40 to 120 ft. The different species are white, blue, black, pumpkin, red and water ash. Prickly ash and mountain ash are trees of other families.

Ash Wednesday. See LENT.

Ashan'ti, or **Ashan'tee,** a British possession of western Africa lying north of the Gold Coast and extending from the Ivory Coast on the west to the Volta River on the east. The country is heavily forested but certain localities have been cleared and produce large crops of yams, barley, rice, tobacco and corn. The natives were formerly supposed to be a fierce warlike people, but now they are industrious and peaceable and excel in fashioning gold ornaments, pottery and swords. They also manufacture cloth, brilliant dyes, leather and iron. They export gold, ivory and dyewoods. The area of Ashanti is probably about 11,000 sq. m., and its population is 287,814.

Ashburton Treaty. See WEBSTER-ASHBURTON TREATY.

Ash'es, the residue from the burning of animal or vegetable matter. They are the source of many important commercial products. The lye produced by the "leaching" of wood ashes is used in making soft soap, and, on a larger scale, in the manufacture of potash. The name potash is an abbreviation of pot-ashes, which signifies the method by which it was made. Other useful elements are derived from animal and plant ashes: iodine, sodium and bromine from seaweeds; phosphorus from bones; and rubidium, silicon and cæsium from various plants. Wood ashes are frequently used as fertilizers on account of the elements contained which are necessary to plant life.

Asheville, N. C., a city and the county seat of Buncombe Co., 275 m. w. of Raleigh and 262 m. n.e. of Atlanta, Ga., at the confluence of the Swannanoa and the French Broad rivers, and on the Southern Railway. The region about Asheville is rich in timber and mineral resources. Precious stones are also found in the vicinity. The land is adapted to fruit growing, truck gardening, poultry raising, dairying and the raising of stock. Electric street cars traverse the entire city and also extend to West Asheville, radiating from Pack Square as a common center. Among the manufactures are agricultural imple-

ments, wagons, brick, cotton goods, tanned leather, wood novelties, machinery, furniture, coverlets, mattresses, shuttle blocks, boxes and veneer.

Asheville is a city set on a hill in the midst of beautiful scenery of the Blue Ridge Mountains, at an elevation of 2300 ft., and is famed as a summer and winter health resort. There are fine roads for motoring and driving and a golf course on the slopes of Sunset Mountain. In and near the city, which is an educational center, are a normal and collegiate institute for young women and a home industrial school, both under the auspices of the Board of Home Missions of the Presbyterian Church; the Asheville School for boys; the Asheville School for girls, incorporated; the Asheville Farm School for white youth; Bingham Military School, founded in 1793 at Pittsboro and removed to its present site in 1891; and St. Genevieve College for girls. The notable buildings include the post office, government building, city hall, county courthouse, auditorium, public library and numerous elegantly-equipped hotels and sanitariums. Grove Park Inn, opened in 1913, is the finest and most unique tourist hotel in America. The places of scenic interest are Round Knob, approaching the city, Richmond Hill, Overlook Park, Beaumont, Connally's View, Riverside Park and Lake and Swannanoa Drive. There are 30 churches and missions. About two miles southeast of the city is Biltmore, the magnificent private estate of Mr. George W. Vanderbilt of New York City. The Pisgah National Forest of more than 100,000 acres extends its eastern boundaries to within 10 miles of Asheville. An excellent motor road connects Asheville with the forest. The city has become famous as the great all-year-round tourist resort and playground of America, entertaining as many as 200,000 visitors annually. First settled in 1792, Asheville was incorporated in 1835 and is administered under a revised charter of 1901. Population in 1920 U. S. census, 28,504.

Ashland, Ky., a city of Boyd Co., 146 m. s.e. of Cincinnati, on the Ohio River and on the Norfolk & Western, the Chesapeake & Ohio and other railroads. There are important manufacturing interests here; the leading factory products are sheet steel, steel billets, wire rods, cut and wire nails, pig iron, oak and poplar lumber, leather, furniture stock and fire brick. An extensive trade in iron ore and coal is carried on. The city has two pleasure grounds—Central Park, a 50-acre tract in the center of the city, and Clyffeside Park, an amusement resort beyond the city limits controlled by a corporation. Ashland was settled in 1854, and was first chartered as a city in 1870. It is governed under a revised charter of 1894. Population in 1920, U. S. census, 14,729.

Ashland, Wis., a city and the county seat of Ashland Co., about 70 m. e. of Superior and Duluth and 351 m. n.w. of Milwaukee, at the head of Chequamegon Bay, an inlet of Lake Superior; and it is connected by steamers with the principal lake ports. Railroads entering the city are the Wisconsin Central, the Chicago & North Western and the Northern Pacific. The town has one of the best harbors on Lake Superior and well-equipped iron-ore, coal and merchandise docks. It is the principal port for the shipment of iron ore from the Gogebec Range and has a large export trade in lumber and other products, the lake trade amounting to more than $35,000,000 annually. There are valuable brownstone quarries in the vicinity, which give rise to an important industry, while within the town are charcoal blast furnaces for the manufacture of pig iron, foundries, saw and planing mills, iron and steel rolling mills, machine shops, railroad repair shops and knitting mills, as well as manufactories of wood alcohol, dynamite and sulphite fiber.

Attractively situated in a dry, healthful climate, Ashland is a popular summer resort. Important features of the town are a handsome Federal Building and post office, a fine high-school building, the Vaughan Public Library, the Northland College and Academy (Congregational),

an opera house, a Roman Catholic hospital, the Rinehart Hospital and the Knight Hotel. The Apostle Islands in the bay near by constitute an interesting feature. Ashland was settled about 1854 and incorporated as a village in 1863; it was chartered in 1887. Population in 1920, 11,334.

Ash"tabu'la, Ohio, a city and important railroad center of Ashtabula Co., 54 m. n.e. of Cleveland, on Lake Erie at the mouth of the Ashtabula River, and on the New York, Chicago & St. Louis, the Lake Shore & Michigan Southern and other railroads. The extensive railroad and lake commerce makes it an important transfer shipping point for coal and iron ore through its excellent harbor at the entrance of the Ashtabula River. There are large manufactories of agricultural implements, woolen and worsted goods, leather, shafts and machinery. It is also the center of a large agricultural and dairying region. There is a public library. The first settlement was made in 1803 and a city charter granted in 1892. On Dec. 29, 1876, a railroad accident here resulted in the loss of over 100 lives. Population in 1920, U. S. census, 22,082.

Asia, *A' shi a,* the largest of the grand divisions into which the earth's surface is divided and occupying nearly six-sevenths of the Continent of Eurasia. It lies in the northern division of the Eastern Hemisphere, extending from 26° to 130° east longitude and from 1° 15′ to 77° 37′ north latitude. All its boundaries, except the western, are formed by the ocean, the icy Arctic on the north, the Pacific on the east and the tropical Indian Ocean on the south. To the west it joins Europe and connects with Africa by the narrow Isthmus of Suez. The Ural and the Caucasian mountain ranges and the Black and Caspian seas form the boundary between Europe and Asia. It is divided from the Continent of North America, to the northeast, by the Bering Strait, about 40 m. wide.

Size. Asia includes nearly one-third of the total land surface of the globe. Its greatest length from east to west, from the Japan Islands to the Dardanelles, is 5500 m.; its breadth, from north to south, is 5100 m. The total area, inclusive of the islands, is about 17,000,000 sq. m. Its form is that of a spherical triangle, with the apex to the northeast, two almost equal sides about 6500 m. long and a base, 4500 m. in length, formed by the Indian Peninsula, the Bay of Bengal and the Arabian Sea. It has a coast line of about 33,000 m., and its numerous gulfs and bays afford opportunities to navigation and commerce inferior only to those of Europe and North America.

Coast Waters. The northern, or Siberian, coast has deep indentations formed by the mouths of the rivers flowing into the Arctic Ocean. It lies almost wholly north of the Arctic Circle, and, ice-bound through a great part of the year, is unavailable for navigation. There are practically two eastern coasts, the one formed by the continent itself and the other by the fringing islands. Both are steep and irregular. Two large peninsulas, the Kamchatkan and the Korean, approach the islands from the inner coast. Extending from north to south are the Bering Sea, Sea of Okhotsk, Sea of Japan, Yellow Sea, East China and South China seas. The eastern shore ends in the Malay Peninsula, which is only 45 m. wide at the Isthmus of Kra. This narrow body of land is bounded on the east by the Gulf of Siam and on the west by the Gulf of Martaban. The peninsulas, the Dekkan and Arabia, extend into the Indian Ocean, and along the broken coast line are formed the Bay of Bengal, the Arabian Sea, the Persian Gulf and the Red Sea. The entrance to the Red Sea is by the Strait of Bab el Mandeb; through the Suez Canal, cutting the Isthmus of Suez, exit is gained to the Mediterranean Sea. The western water boundaries continue from the Mediterranean through the Ægean Sea, the Dardanelles, the Sea of Marmora, the Bosporus and the Black Sea. The Caspian Sea forms a large inland lake between Europe and Asia.

Islands. There are several important groups of islands on the east and south-

east, extending far seaward and forming a connecting link with Australia. The largest groups are the Japanese Islands, the Philippine Islands and the East Indies. To the latter belong Borneo, Sumatra and New Guinea, among the largest islands in the world. In the Sea of Okhotsk is the Island of Sakhalin; between Japan and the Philippines lies the large Island of Formosa. Hongkong is off the coast of China, and Ceylon is at the southern extremity of India.

Physical Features. The topography of Asia is unique by reason of the fact that here are found the highest mountain ranges, the loftiest peaks, the largest table-lands and the most extensive lowlands in the world.

Highlands. There are two great continental divides. The lower stretches from the Black Sea through the Elburz, Hindu Kush and Thian Shan mountains and northeast to the Bering Strait. It is not continuous, nor is its eastern part remarkable for extremes of altitude, 5000 ft. being a fair average. The other, in altitude and extent one of the greatest in existence, begins at the Amur River, includes the Kuenlun and smaller mountain ranges and the Himalayas. The two systems are connected by the Pamir highlands, rising at the conjunction of India, Turkestan and Afghanistan, about 1000 m. southwest of the center of the continent. Separate portions of these systems are, in the northeast, the Altai, the Yablonoi and the Stanovoi; connected with the Himalayas, the Hindu Kush, Altyn Tagh, Nanshan, Karakoram, Kuenlun; in India are the Vindhyas and the Ghats. West of the Pamirs the Hindu Kush and the Elburz mountains bound the Plateau of Iran on the north, while the Zagros range bounds it on the south.

The highest peaks are found in the Himalaya system. Here are Dhaulagiri (26,800 ft.), Kunchinjunga (28,000 ft.) and Mt. Everest (29,000 ft.). In the mountains of Armenia is Mt. Ararat, celebrated in Bible history. The Pamir Plateau is frequently referred to as the "roof of the world" because of its extraordinary altitude, even its valleys being from 11,000 to 13,000 ft. above sea level. East of it is the Plateau of Tibet, the most elevated plateau on earth, a bleak and barren region extending to heights of about 17,000 ft. Other table-lands are those of the Dekkan and the Iran in Persia, Afghanistan and Baluchistan, including the Plateau of Arabia and Asia Minor.

Lowlands. In the northern part of Asia is the great Siberian plain, covered by large swamps of peat mosses, or tundras. In eastern China and in India are also extensive lowlands, along the flood plains of the great rivers. A further depression is in the neighborhood of the Caspian and Aral seas. The largest desert is that of Gobi, which lies north of Tibet and south of the Yablonoi and Thian Shan mountains. It is a vast, waterless, sandy or wind-blown space, whose elevation scarcely reaches 2000 ft. above sea level. There are also deserts in Arabia, Persia and Hindustan.

Rivers and Lakes. There are seven great river systems of Asia. The first, or Mesopotamian, includes the Tigris and the Euphrates; the second, the Indus with its tributaries; the third, the Ganges and the Brahmaputra. The Indo-Chinese comprises chiefly the Irrawaddy, the Mekong, the Salwen and the Menam; the Chinese, the Si-kiang, the Yangtse-kiang, the Hoangho and the Amur; the Siberian, the Obi, Yenisei and the Lena; and the Russian Turkestan, the Ural, Amu-Darya, Syr-Darya, Ili and Tchui. The largest of these systems is that of the Obi, which includes more than 1,000,000 sq. m.

There are innumerable lakes of varying sizes. The Caspian Sea and lakes Baikal, Balkash and Issikul are the largest, and all are practically inland seas. The Caspian and Aral seas, lying east of the Caucasus range, have no outlet. The Dead Sea in Syria is 1300 ft. below sea level. Highland lochs are frequent, and in Tibet and the Desert of Gobi are several lakes without outlet. Lake Baikal, in the southern part of Siberia, is a fresh-water lake, and feeds in part the Yenisei River. Lake Balkash, north of the

Thian Shan Mountains, has no outlet and is extremely salt.

Minerals. Asia has a wealth of mineral resources. Among precious stones the diamonds of Golconda, the rubies of Burma, the sapphires of Ceylon and the jade of Turkestan are world-famous. Gold is mined in the Ural and Altai mountains and in eastern Siberia. The Ural Mountains contain also the largest deposits of platinum in the world. Graphite, silver and copper are found in Siberia. In the vicinity of the Caspian Sea and in Burma and Sumatra are fields yielding an abundant supply of petroleum. Iron-ore deposits are found in the interior, but methods for mining are antiquated. In Japan are copper and mercury, and fairly large and unexplored coal deposits. The coal fields of China are immense. The tin mines of the Malay Peninsula are unsurpassed in wealth.

Climate. Asia has a greater variety of climate than any other continent. This is due to its extent through the three zones, as well as to its varying degrees of altitude. The Arctic area is dry and its winters are long and extremely severe. The mean average of rainfall diminishes from 10 to 20 inches to one or two inches along the coast. The summers are short, but hot. In central Asia there are extremes of climate, and as a result vegetation is scanty and population sparse. Rain falls in the western part chiefly in the winter and in the eastern in the summer. In the south the difference of temperature is greatly reduced, and near the equator the variation diminishes to a matter of only 5°. The Malay Peninsula has excessive precipitation. Throughout the whole of southern Asia, the rainfall is periodic, the heaviest downpour being during the summer months. The normal winds are the trades. Periodically the monsoon winds set in; the cyclones and typhoons of the Indian waters do great damage to the ships at sea, as well as far inland.

Plant Life. The plant life of Asia is varied, but not materially different from that of Europe in equivalent latitudes.

The configurations of the land, such as forest, savanna, tundra, steppe, jungle and desert, have their characteristic vegetation. In the Arctic area only the surface of the soil thaws and what are trees in better conditions are here merely shrubs. Willow, spruce, larch and birch are the chief varieties. Cranberries, mosses and lichens abound. In the summer the Siberian lowlands become gay with poppies, saxifrage and mountain plants such as grow in Europe. Farther south are forest areas along the river valleys. The deserts contain grasses here and there, but no bushes. The steppes are either grass-covered or sterile. At intervals the melting snows of the mountains form perennial streams, and the oases which they water are rich and fertile. The vegetation of southern Asia is tropical. Among the numerous palms, the coconut is perhaps the most common. The bamboo reaches gigantic proportions, and the trunks of the banyans and screw pines are heavy with creepers, while moss feeds on their branches. In Arabia, Persia and southwestern Asia in general, aromatic shrubs abound. The islands have a partial vegetation, at least, peculiar to themselves. Among the economic plants are the cereals—wheat, rye, oats, rice—cotton, indigo, sugar cane, coconut, tamarind, breadfruit, vines, pomegranates, oranges, figs, olives, pepper, clove, vanilla, coffee, tea, cacao, cinchona, sugar and lac.

Animal Life. There are two general divisions of the fauna of Asia, the northern and the southern. Despite the rigorous climate, there are several representatives of animal life in the north. Of the Mammals the distinctive types are wolves, bears, weasels, wild sheep, deer (especially musk) and antelopes. Among birds are partridges, grouse, the raven, gyrfalcon, snowy owl and Alpine ptarmigan. The huge mountain sheep are favorite game on the Pamirs, the native horses and asses range the mountainsides. In Arabia the fauna is African. The camel is essentially a part of the desert, and serves man beyond the

borders where horses penetrate. The yak of Tibet has become as indispensable to that region as the camel is to the desert or the reindeer to the snowy North. The tiger, elephant and rhinoceros belong fundamentally to the southern part of Asia. The tropical fauna has among its chief types the monkey and the reptile. The cobra de capello, an extremely deadly snake, the boa and the python are the largest serpents found. Donkeys, mules, the Indian buffalo, leopards, oxen, lions and porcupines are common. Tropical birds exist in the forests in large numbers. In the southern waters divers treasure the pearl oyster; in the polar seas, animals are hunted for bone, skin and oil. Almost all the domestic animals the world over are of Asiatic origin.

Inhabitants. The inhabitants of Asia belong chiefly to the Caucasian, or white, the Mongolian, or yellow, and the Malay or brown, race. There are a very few representatives of the red race (such as the inhabitants of the northeastern part of the continent, principally of Eskimo stock), and of the black race (including the Negritos of the Philippines and of surrounding islands and the negroid Dravidians of the Dekkan and Ceylon). The Mongolian race is by far the most numerous, including two-thirds of the inhabitants. It is divided into the Siberian branch and the Tibeto-Chinese. To the latter belong the Chinese proper. Closely related to this latter division is the brown race, including the Japanese, Sundanese, the Malays of Malacca, the Filipinos and the inhabitants of Borneo, Formosa and the other islands. The white race is in part indigenous to Asia; at least this has been its home since a very remote antiquity. To it belong the Aryans, the Caucasians in a limited sense and the Semites. They live principally in Asia Minor, Arabia, Persia, Siberia, India, Baluchistan and Afghanistan (See Ethnology). The total population of Asia is estimated at 905,000,000, more than half that of the entire world.

Political Divisions. Only a small portion of Asia enjoys independent government. The greater part is controlled by European powers. The independent countries are the Chinese Republic, Japan, Persia, Turkey and Siam. Arabia, Afghanistan, Nepal and Bhutan are partially independent. The British possessions include India, Burma, Ceylon, Cyprus, Hongkong and a few other regions; the French, Cochin China, Annam, Cambodia, Tonkin and a few smaller settlements. Russia controls Siberia and a great part of central Asia.

History. It has generally been accepted that Asia is the cradle of the human race. The most ancient civilization is that of Mesopotamia, centering around the Euphrates and the Tigris rivers. The oldest empire which sprang up here, the Chaldean, dates back to the dawn of history. A second civilization more limited in its influence because of natural restrictions sprang up on the flood plains of the Himalayan rivers; China also possesses a magnificent civilization which can be traced to a remote antiquity. Through Cyrus the Persian Empire was brought in contact with the Grecian civilization, and this marks the beginning of European influence, which was felt strongly at that time by reason of the fact that Persia was then the most dominant power of Asia. Alexander conquered Persia in 330 B. C., and Hellenism was the chief power until the Roman Empire gained possession of the territory. Neither the Greek nor the Roman civilizations, however, penetrated farther than Asia Minor.

Asia has been the birthplace of all great religions, Brahmanism, Buddhism, Confucianism, Mohammedanism and Christianity. The last, the influence of which has most fully permeated the civilized world, was accepted by Armenia and gained a foothold in Asia Minor at the time when the Roman power was at its height. The rise of Mohammedanism occurred in the seventh century A. D. The Turkish power constantly increased, and Persia, Syria and a part of Egypt were subjected. The southern part of Europe was repeatedly overrun by the Mohammedans, or Saracens. The Cru-

sades and the Fall of Constantinople mark important events in the history of Asia Minor, as well as of Europe.

The influence of European powers made itself felt in eastern Asia in the 15th and 16th centuries. The Mohammedan sway was extended to India in 1000. Near the end of the 13th century China and Turkestan were overrun by the Mongols. The last pastoral invasion of western Asia by Ottoman Turks took place less than 500 years ago. China recovered its independence about 1368, though not completely until later. The Russian Cossacks conquered Siberia in 1580-84. The voyage of Vasco da Gama to India in 1498 opened up a new sea route, and soon the Spanish, Dutch, Portuguese, French and British made steady inroads and established permanent trading posts. Asia has been the country of absolute monarchies. A transformation more or less complete has been brought about politically and economically through the application of European ideals, capital and control, and in all lines the Eastern world has begun to make itself felt in competition with the Western.

Asia Minor, the ancient name of the territory now known as Anatolia. It comprised Bithynia, Pontus, Mysia, Lydia, Paphlagonia, Caria, Lycia, Pamphylia, Pisidia, Cilicia, Isauria, Galatia, Phrygia, Cappadocia and Lycaonia; also Troas, Æolis, Ionia and Doris on the western coast. The Lydian Empire ruled in the seventh century B. C., but in the following century Asia Minor passed under Persian rule. It was portioned out among the generals of Alexander the Great after his death; and passed from Roman to the Turkish rule.

Asp. See VIPER; COBRA.

Aspar'agus, a genus of plants of the Lily Family, members of which are widely prized as decorative plants and one of which is a popular spring vegetable. The ornamental asparagus plants are of many kinds. The majority have thin, wirelike stems beset with peculiar little branches, which are tiny and feathery and are often mistaken for leaves; the true leaves, however, lie beneath these and are no more than tiny scales. Among these are the asparagus ferns and the smilax (See SMILAX), which are tropical plants but familiar in Northern greenhouses. Some of the asparagus ferns are climbing plants and some are hardy, erect herbs with tough, fibrous stems.

Probably the most widely known of this genus is the edible asparagus, whose young shoots make such a popular spring vegetable. These are raised from seed or from "sets" and should be planted in rich, well-fertilized soil. When planted from seed, it is advisable to plant early radishes with them, as the latter grow rapidly and mark the spots where the slow-growing asparagus shoots are to appear. For the plants to thrive well the weeds must be kept down and the plants thinned until from four to eight inches apart. The second year they should be transplanted to permanent beds where they should be from two to four feet apart. The shoots should be picked when they first appear, but are snapped off about six inches below the surface. They may be cut daily until "peas come," and then should be allowed to grow in order to store up nourishment for another year's growth.

The largest asparagus farm in the United States, and perhaps in the world, is upon Baldwin Island in the San Joaquin River, Cal. About 1500 persons are employed there and the shoots are put up for the market canned or in bunches. About 650 cars of the cans are shipped from this farm during the season. It has been estimated that 12,000,000 bunches of asparagus are sold in the United States annually.

Aspasia, *As pa' shi a,* (about 479-410 B. C.), a celebrated woman of ancient Greece, noted for her beauty, genius and political influence, born at Miletus. After her marriage with Pericles her home became the meeting place for men of talent and distinction; her influence was reputed to have caused the Samian and Peloponnesian wars. She is thought to

have written in part the funeral oration in honor of the Athenians who died in battle about 430 B. C.

As'pen, or **Large-Tooth Poplar,** a common tree of the Willow Family, easily recognized by its bark, which is smooth and of a gray-green color when young, but which becomes furrowed and darker with age; for this reason the base of the trunk is very different from the upper part. The straight, cylindrical stem bears a rounded top of loose foliage, which gives forth, in the slightest breeze, a papery rustling due to the twisted arrangement of the stems. The leaves, when young, are covered with a dense, white wool, but later become smooth and shiny in color, dark above and silvery underneath; the edges have shallow, irregular scallops. The flowers grow in very loose catkins, followed in May by capsules of tiny dark brown seeds. The aspen grows commonly in the United States east of the Mississippi and north of Georgia. The wood, which is light, is used in the manufacture of excelsior, paper and woodenware, and sometimes for lumber.

Asphalt, *As' falt,* or **Asphaltum,** *As falt' um,* a form of bitumen having nearly the same chemical composition as bituminous coal. The process of natural formation is constantly going on and the material is of wide geographical distribution. A liquid bitumen, known as mineral tar, has been found in Alsace; and a similar material is procured from deposits situated under the seashore of California near Santa Barbara. The beach sand, acting as a sponge, absorbs the bituminous substance beneath; this sand is removed to a factory where the asphalt is separated. The solid asphalts are more important, of which the purest are known as glance pitch or gum asphaltum. Of these the best is the Bermudez asphalt, found in Venezuela, which contains 90 per cent of bitumen, and is valuable for paving because of its plastic quality. By far the most important deposit of asphalt occurs on Trinidad Island. It occupies a basin 78 ft. deep in the center, has a surface area of 114 acres and a volume of 6,000,000 tons. It is supposed to fill the crater of an ancient volcano. It contains 60 per cent of bitumen and is very plastic. Though sufficiently resistant to hold a wagonload driven across it, it fills up its excavated cavities in the course of a few months. The asphalt prepared from these beds is extensively used for street paving. Other solid asphalts of high quality are found in Oklahoma and on the Pacific coast; and asphaltic limestones, used for paving in European cities, are found in France, Switzerland, Sicily and Germany. Bituminous sandstones occur in California, Colorado, Utah, Texas and Mexico. That found in Utah is called gilsonite. Artificial liquid asphalts are produced from California petroleums; and byerlite, a variety of artificial, solid asphalt, is obtained by passing oxygen through petroleum oils; and from fish oils a kind of artificial gilsonite is procured.

The purest asphalts are used in the manufacture of varnishes and insulating paints; but the most important use to which this article is put is in paving, having first been used for this purpose in 1838 for paving sidewalks in Paris. European paving is largely asphalt blocks made from crushed stone, and refined, solid asphalt pressed into forms by machinery. Mastic is a kind of block asphalt. In the United States a "street mixture" is prepared with asphalt cement, liquid maltha, or petroleum residuum, refined solid asphalt and sand. The street is first lowered eight or nine inches, carefully graded and a concrete foundation laid uniformly over an area the length of one or more city blocks at a time, and "set" with a road engine. Then the composition, which has been heated to a temperature of about 250°, is dumped on, evenly distributed by hand with hot rakes and iron smoothers and pressed with a steam roller.

As'phodel, a beautiful flowering plant of the Lily Family, which is cultivated as a house plant or in gardens. The stem grows to a height of three feet or less, but the large leaves all proceed from the root. The flower is always

tubular but has six spreading lobes. There are six curving stamens surrounding a thickened pistil. Our commonest species are the white and the yellow asphodel, named from the color of the flowers. The first has a smooth, much-branched stem, with large flowers extending from the flower stalk. The yellow asphodel has a longer, somewhat leafy, straight stem, bearing many flowers, smaller than those of the preceding species but more thickly set. Many varieties are in cultivation because of the great beauty of the flowers and the ease with which the plant may be grown.

The white asphodel is the emblem of life, and the angel of life is often represented as bearing a branch of the pure white blossoms. Such reference is beautifully made in Longfellow's poem *The Two Angels.*

As'quith, Herbert Henry (1852-), an English statesman, born at Morley, in Yorkshire, and educated at Balliol College, Oxford. After leaving Oxford he practiced law, in which he gained some distinction, but his ambitions lay rather in the direction of politics. In 1886 he was elected to Parliament, and during his subsequent terms of office he gained the favorable notice of Gladstone, who was attracted by his ability as a speaker and his good political judgment. In 1892 he was made home secretary in the new Liberal ministry, holding this office three years and confirming the high opinion formed of his abilities. In 1895 the Liberals were defeated, but during the years the Unionists were in power Mr. Asquith remained a prominent leader among the Liberals, so that in 1908, when Mr. Henry Campbell-Bannerman resigned the premiership, he was the latter's logical successor. Under his leadership the Liberal ministry has been a notable one. The rejection by the House of Lords of the Budget of 1909 brought on the election of January, 1910, which left the Liberals and Unionists practically equal, with the Labor and Irish parties holding the balance of power. By concentrating the forces of the Liberals, Laborites and Irish Home Rulers against the Unionists, the House of Commons forced through Parliament the bill which removed from the lords the absolute veto power, a notable step in English constitutional history. In 1912 the question of Home Rule for Ireland outweighed all others in legislative importance. Other features of the Liberal program during the Asquith ministry were social reform, franchise reform and the disestablishment of the Welsh Church. This was the government in charge of affairs at the outbreak of 1914, and must be credited with sincere efforts to maintain the peace and with the final resolve to stand by its treaty obligations with Belgium. Mr. Asquith resigned the leadership in 1916. At that time party distinction was swept aside in England, the whole nation united to prosecute the war to a successful conclusion and Mr. Asquith gave way to Lloyd George.

Ass, A member of the Equine, or Horse Family, found wild in Asia and Africa and domesticated in many countries as a beast of burden. The wild ass, which lives in sterile, rocky countries and yet is dependent upon water, is rapidly becoming extinct. It is an alert animal, smaller than the horse and has a shorter mane and a thin tail. Its ears are long, its coat sleek and its hoof small and well shaped. The limbs, which show scarcely visible stripes, reminding one of the zebra, differ from those of the horse in having inner callous spots, or "chestnuts," on the forelegs only.

The domesticated ass is a patient animal, often annoyingly deliberate and seemingly stupid; it is, however, sure-footed and capable of great endurance. It is commonly spoken of as the donkey and has become the type of obstinacy and dullness.

As"sam'. See INDIA.

Assault' and Battery. Common law grants everyone the right of personal safety and freedom. An attempt to inflict bodily injury upon another is considered an assault, and when bodily injury is inflicted the offender is guilty of the crime of assault and battery.

Assay'ing, the process of determining how much metal, as gold, silver, mercury, copper, iron, zinc or lead, is contained in an article, usually ore. Miners take samples of ore from different sections of the vein, so that an average assay can be made, to see how much the ore will produce per ton; on this its value is reckoned. The process employed depends upon the character of the ore or metal to be tested. The dry process is called cupellation, because a very small porous cup, known as a cupel, is used. This process is employed principally for assaying ore containing silver, and is based upon the fact that when an alloy of gold, silver, lead and other metals is heated in a current of air, the lead and the other base metals will oxidize, and the melted lead oxide (litharge) will retain the other oxides in solution. The cupel containing the alloy is wrapped in sheet lead and put into a muffle, a kind of fire-clay oven with slits to admit air; this, in turn, is set into the furnace and heat applied. The heat causes the lead to volatilize or combine with the other metals, and to sink and be absorbed in the cupel, leaving a bright bead of pure metallic silver, which gives the amount of silver in the ore or alloy.

Another process consists of dissolving the alloy in nitric acid, to which has been added common salt, and all silver present will be precipitated in the form of chloride of silver, the quantity of silver being determined by knowing the amount of salt used and the gold remaining behind not affected. The streak method is used principally in testing the fineness of alloys, coins and silverware, or of articles which would be damaged by cutting or boring into them. This method consists simply in rubbing the article on a rough surface and producing a streak, and from its appearance the assayer is able to determine the grade. In New York City and in all the mining centers of the United States, assay offices are maintained by the government for the benefit of the public; a nominal charge is made for the determining of the standard of jewelry, silver plate and all articles containing the precious metals. See METALLURGY; GOLD; SILVER; MINT.

Assay' Office, a branch of the United States Mint which assays, sorts and refines bullion, jewelry and old gold in any form, and buys gold refined by it, paying for the same through the Federal Treasury in gold coin. For silver received, it returns silver bars. Assay offices are maintained at Seattle, Wash., Boise, Idaho, Helena, Mont., Carson City, Nev., Deadwood, S. D., St. Louis, Mo., Charlotte, N. C., and New York City; the last named handles a very large proportion of the gold and silver bullion submitted to the government for assay and marking. It is said to be the only free gold market in the world. Certain nominal fees are, however, charged for services performed.

Gold coin is not sought by shippers of gold, because of the considerable loss resulting from abrasion, perhaps $100 on a shipment across the Atlantic of $1,000,000 in coin. Small gold bars, for sale according to their size at $100 or more, and larger bars worth from $5000 to $8000, are sold at a premium of four cents per $100 because they suffer less from abrasion in shipment. Each deposit of gold is assayed separately, but it is the usual practice to melt about 4500 ounces of gold at one time in refining, and a depositor does not always receive the particular gold which he submitted. In 1908 gold bars valued at $162,000,000 were made by the government, and nearly three-fourths of the total were manufactured by the New York office. See ASSAYING; MINT.

Assin'iboin, a tribe of Sioux Indians once living between the Missouri and Saskatchewan rivers. They are called "stone-cookers" because their method of boiling water was by dropping hot stones into it. About 2600 Assiniboins live in Canada and in Montana reservations.

Associated Press, a news-gathering corporation employed principally by newspapers and periodicals. It was formed for this purpose in 1849 by the owners of several New York newspapers,

among them the *Herald, World, Times, Sun* and *Tribune*. Its object was to gather news in a systematic manner and sell the service to those papers who wanted it. Thousands of newspapers are now furnished with news by the Associated Press, and it controlls thousands of m. of telegraph, as well as owning controlling stock in several cable lines. It collects news from every part of the world and transmits it to its branches, which are maintained in the eastern, western, southern and central sections of the United States. From the central office in each of these sections news is sent to the patrons of the Association. The Associated Press is in daily touch by telegraph with all news centers. When any great disaster or war occurs, even in a remote country, a correspondent is sent there to write up the news. An Associated Press Dispatch is generally of interest to the reading public, and usually is reliable news. Since the organization of the Associated Press, other news-collecting companies have been formed, and the one in Europe is known as Reuters Agency. The amount of service performed by these corporations is very large, its cost being estimated at several hundred thousand dollars per month.

Assuan, *Ahs swahn'*, an Egyptian town situated on the east bank of the Nile, just below the first cataract. It is the site of the great dam across the Nile erected by the British Government for irrigation purposes (See IRRIGATION). The town is near the great granite quarries, from which the ancient Egyptians obtained most of the stone for their temples, tombs, obelisks and statues. A garrison is maintained here, and the town has a valuable trade with the surrounding country. Population, about 10,000.

Assump'sit, an action at common law brought for the purpose of recovering compensation of the one against whom the action is brought for his failure to perform his part of a verbal or parole contract, as failure to pay for goods purchased and delivered. The purchase and acceptance of the goods implies a promise to pay. The employment of labor implies a promise to pay, and the laborer can bring action for the recovery of his wages. In modern legal practice, assumpsit has been extended to cover action for recovering money for almost any cause except damages.

Assyria, *A sir' i a,* an ancient country occupying the northern part of the Mesopotamian plain. It was bounded on the n. by the mountains of Armenia, on the e. by Media, on the s. by Susiana and Babylonia; its western limit is thought to have been the watershed of the Euphrates. This country embraced an area of about 75,000 sq. m. It was crossed by several mountain chains and watered by the Tigris and its tributaries. Its more fertile portion lay to the east, where clustered the many cities that finally were combined into the Assyrian monarchy.

PEOPLE. The early settlers of Assyria were of the same branch of the Semitic race as their southern neighbors, the Babylonians, whom they closely resembled in many respects. The Assyrians, however, were more rugged and aggressive in warfare. The two peoples had the same form of religion—a worship of many gods representing the powers of nature. The chief deity of the Assyrians was Ashur, the name also of the ancient capital. Large temples were reared for the carrying on of their worship, and there developed an elaborate organization of priests. They had a literature consisting of hymns to the gods, mythological poems and works on law and science. The material used for writing was clay, on which were inscribed peculiar wedge-shaped symbols (See CUNEIFORM INSCRIPTIONS).

The Assyrians surpassed the Babylonians in architecture and sculpture, but were inferior to them in the other arts and sciences. Assyrian sculpture was remarkable for its colossal man-headed bulls and lions guarding the portals, and its decorative scenes in low relief. Their buildings were of brick, with stone foundations and stone facings for the walls. Their palaces were quadrangular, having chambers grouped around three

courts; the temples were pyramidal in shape. These people advanced far in the industrial arts, and fashioned richly embroidered garments, highly finished arms and armor, carvings in ivory and silver, and bronze vessels decorated with gold.

History. Assyria first comes into the light of history in the 19th century B. C., then a dependent province belonging to the Chaldean Empire. About 1000 B. C. it attained supremacy over Babylonia under the leadership of Tiglath-Pileser I. This monarch, who assumed the title "King of the Four Quarters of the World," made Ashur the capital of the kingdom and extended and fortified his dominions to the north, northeast and northwest. After the death of Tiglath-Pileser the Assyrians and Babylonians contended for supremacy until the reign of Asurnazirpal (B. C. 885-860). This vigorous and warlike ruler made Assyria a great empire, and Babylon was forced to give up the hope of regaining political supremacy. Nineveh, which was made the capital of Assyria after the death of Tiglath-Pileser, became mistress of the Eastern world. The next king, Shalmaneser II (B. C. 859-825), continued the military activity of his predecessor.

In 745 B. C. Tiglath-Pileser III seized the throne, and established the most powerful empire the world had yet seen, and one which was well organized. Assyrian satraps ruled many of the subject kingdoms, thus lessening the tendency to rebellion. Sargon II (B. C. 722) was the great ruler who carried away the ten tribes of Israel into captivity (See Israel, Kingdom of). He also put an end to the power of the Hittites, made Judah a subject kingdom and Babylonia a dependent province, and forced the cities of the Mediterranean to pay tribute. Sargon's son Sennacherib subdued the King of Judah, who had revolted. This is the ruler whose army, according to the Biblical account, was destroyed by a pestilence. Esarhaddon (B. C. 672), son of Sennacherib, began the conquest of Egypt, which was completed in the reign of Asurbanipal, his son. Asurbanipal kept the empire intact by ceaseless warfare, but after his death a rapid decline set in. Egypt and Babylonia revolted, and Scythian hordes repeatedly invaded the country from the north. In 606 B. C. Nineveh was captured by the combined forces of the Medes and Babylonians, and Assyrian supremacy was at an end. See Babylonia.

Aster, a widely distributed class of herbs and shrubs of the Composite Family, containing many wild and many highly cultivated plants. The aster may be recognized by its erect fibrous stems, much-divided, hairy leaves which alternate in position on the stem, and flat heads of flower surrounded by a single or double row of thin, grooved, petal-like rays. These heads are enclosed by a thick cluster of leaflike scales called an involucre. The rays of the aster may be white, purple, red, pink or blue, but are never yellow, and the flowers clustered upon the disk are frequently lighter in color than the rays.

Wild asters of different kinds are found abundantly in the United States generally in dry soils but occasionally in marshes. The various species differ in height, smoothness or roughness of stem and leaves and in general form. The cultivated or garden asters are favorite flowering plants and few flower gardens are without them. Under cultivation the flower heads become full and broad and are thus exceedingly decorative.

As'teroid. See Planetoid.

Asthma, *Az' ma*, a disorder interfering with the breathing, which makes intermittent attacks between periods of health. The attacks take the form of tightness in the chest, difficult breathing, coughing, wheezing and, in some cases, of slight asphyxia. The causes of asthma are not definitely known, but the disease is generally believed to be due to spasm of the muscle fibers of the bronchi. It is aggravated by damp or foggy atmosphere or by impure air, but is seldom fatal. Nervous persons are the more easily affected, and men are more frequently attacked than women. Children are subject to attacks of asthma after

whooping cough, measles or bronchitis. See BRONCHIAL TUBES.

Astor, John Jacob (1763-1848), American merchant and financier, born near Heidelberg, Germany. At the age of 16 he went to London, where, with his brother, he was employed in the making of musical instruments. Four years later he came to New York, and, having learned incidentally of the vast profits in the fur trade, immediately engaged in that business, in which he became eminently successful. He established a number of trading posts, one, at the mouth of the Columbia River, being named Astoria in his honor. He invested his gains in New York real estate and gradually accumulated an enormous fortune. At his death he bequeathed large sums to charitable and educational purposes, among which were $50,000 for the establishment of institutions for the poor of his native village, and $350,000 for the founding of the Astor Library in New York.

Astoria, Ore., a city, port of entry and the county seat of Clatsop Co., 101 m. from Portland, on the Columbia River and on the Astoria & Columbia River Railroad. There are about five miles of water front within the city limits, and several steamship lines connect with home and foreign ports. A large export trade in flour, wheat, oats, wool, live stock, apples, potatoes and lumber is carried on. The salmon fishing and canning industry is one of the most important in the world. In addition to canning factories, other important plants are lumber mills, flour mills, shipyards and ironworks. Noteworthy features of the city are the United States Custom-House and Post Office and St. Mary's Hospital (Roman Catholic). Astoria was founded in 1811 by John Jacob Astor, who established a fur-trading station here. It was chartered as a city in 1876. Population in 1920, U. S. census, 14,027.

Astræa, *As tre' a,* goddess of Justice, was a daughter of the Titans. When her people took up arms against Jupiter she came down to earth, mingling freely with men, during what was known as the *Golden Age.* In the *Silver Age* she crept down from the mountains at nightfall, unseen by anyone, speaking to none. With the *Brazen Age,* however, she returned to the heavens. She was the last divinity to leave sinful man.

Jove made of Astræa the constellation Virgo (the Virgin). As a sign of justice, she holds a balance scale.

As'trakhan, the pelt of the young lambs of a variety of sheep found in Bokhara, Persia and Syria. It takes its name from the city of Astrakhan in Russia. The wool is fine, glossy and tightly curled, and when properly dressed the skins make beautiful cloaks, muffs and boas. A cloth made in imitation of the fur is also called astrakhan.

Astrakhan, a city in eastern Russia, the capital of the government of the same name, situated on an island in the Volga, 50 m. from the Caspian Sea. It has a cathedral, the Monastery of the Trinity, an archbishop's palace and several museums and gardens. As the chief port of the Caspian, it is an important commercial center. The exports are cotton, woolens, fish, caviar, sugar, metals and naphtha. The city gives its name to a fine fur, as well as to an imitation in rough woolen cloth. Population, estimated 162,482.

Astrol'ogy (a discourse on stars), the science by which the appearance or arrangement of the heavenly bodies is shown to foretell or to affect human affairs. Originally among the Greeks and Romans astrology meant the same as astronomy, and both terms had the same origin—the study of the heavenly bodies. For centuries the Chinese, Egyptians and practically all the ancient nations, except the Greeks, were believers in astrology, and even at the present time people can be found in the most civilized countries who have faith in the teachings of this false science.

Astrology was based upon the theory that the earth was the center around which the heavenly bodies revolved. The earth was divided by circles passing through the poles, into 12 spaces, called "houses." By the revolution of the heav-

ens, the sun, moon, stars and planets passed through each of these houses every 24 hours. Each house represented advantages or disadvantages. The first was the house of life; the second, the house of riches; the third, of brethren; the fourth, of parents; the fifth, of children; the sixth, of marriage; and so on until the twelfth, which was the house of death, was reached. The strength of these houses varied according to their position. The first, or that containing the part of the heavens about to rise, was considered the strongest of all. The point of the ecliptic about to rise was called the horoscope (See ECLIPTIC). To "cast one's horoscope," or foretell one's future, was to ascertain what house and star was in the ascendant at the time of that person's birth. If born when Jupiter was in the ascendant, one had a jovial temperament; if when Mercury was in the ascendant, a mercurial temperament; and so on. These terms are still common in describing characteristics, though they are now used without any reference to their origin. The expression "lucky stars" also originated from the same source. If stars symbolizing prosperity were in the ascendant at one's birth, a bright future was prophesied; if these stars were descending, however, the future was filled with forebodings. With the advance of astronomy, astrology declined, but it is still practiced to some extent in the Orient. See ASTRONOMY.

Astronomy, the science that treats of the heavenly bodies. It is the earliest of all the sciences, developing from the science of astrology. From the most remote times the heavens have been an object of study. In the ancient literature of Babylonia, Egypt, Chaldea, Arabia and Greece are found records of careful observations and of attempts to mark time by means of the movements of heavenly bodies. Hipparchus, in the second century before Christ, made a catalogue of the stars. Ptolemy, in the second century after Christ, wrote *Almagest,* an important general treatise on astronomy. About 1400 Ulugh Beg, an Arabian, made a better catalogue of the stars.

Modern astronomy may be said to have had its beginning with the work of Purbach in the 15th century. During this century Copernicus (1473-1543) lived and wrought out his theory of the solar system. In the following century Tycho Brahe (1546-1601) of Denmark made another catalogue of the stars and many important observations. At this time Kepler, a pupil of Brahe, worked out the laws of planetary motion that are still accepted. Galileo (1564-1642), in the same century, making the first practical use of the telescope, discovered four of the moons of Jupiter. Newton (1642-1727) came in the following century and worked out his law of universal gravitation. In the next century Herschel (1792-1871) discovered Uranus, made observations of the Milky Way, and did important work in the study of the multiple stars and nebulæ. Lagrange, Lalande, Delambre and Laplace also did great work in this century. The most notable discovery of the 19th century was the finding of Neptune in 1846. Many planetoids also were discovered during the period. The past century was noted also for the rise of astrophysics, spectrum analysis and the use of photography in astronomical research. See SPECTRUM ANALYSIS.

The scope of astronomy is as boundless as the universe, seeking to know not only the solar system, but also all that may be known about the stars, constellations, nebulæ and comets. It seeks to know their orbits and their nature, bringing to its aid physics, chemistry and mathematics. This science has also led to the invention and use of the most delicate and wonderful instruments. The telescope, with its accessories of spectrum and camera all carefully housed in scientifically prepared buildings, is a marvel of human genius. The most noted of such buildings are Royal Observatory at Greenwich, England; Naval Observatory at Washington, D. C.; Lick Observatory, at Mt. Hamilton, Cal.; and Yerkes Ob-

servatory, at Lake Geneva, Wis. See TELESCOPE.

Astronomy also deals with laws that govern in a wide realm and are not easily learned. As they are discovered they are often named for the discoverer, as Kepler's Law and Newton's Law. As laws are learned they form the basis of theories, such as the Copernican System, the Ptolemaic System and the nebular hypothesis. Astronomy is a very practical science. From the earliest times it has formed the basis for reckoning time. At present all of our timepieces are set and our calendars are prepared from astronomical observations. The position of a ship on the sea is also ascertained by astronomical observations. See ASTROLOGY; UNIVERSE; SOLAR SYSTEM; PLANET; COPERNICAN SYSTEM; PTOLEMAIC SYSTEM; NEBULAR HYPOTHESIS; SIDEREAL TIME; BRAHE, TYCHO; HERSCHEL, SIR JOHN FREDERICK WILLIAM; PROCTOR, RICHARD ANTHONY; YOUNG, CHARLES AUGUSTUS; LICK OBSERVATORY; YERKES OBSERVATORY. See Study Guides.

Astrophotography, the science and art of photographing heavenly bodies. As early as 1840 Draper made a photograph of the moon; but only since the last decade of the 19th century has photography become of great service in the study of astronomy. The pencil of the most skillful draughtsman must sometimes fail to locate with exact precision a star, in his picture of the heavens; but the camera is unfailing in this respect, so that by securing photographs of the same section of the heavens at different periods the movement of the stars can be represented exactly on photographic plates by means of delicate instruments.

If a refracting telescope is used for taking photographs a special object glass must be substituted, as the rays of light that imprint the image on a photographic plate are not exactly the same as those that form the image in the eye. In the case of reflecting telescopes this difficulty is avoided, as a mirror reflects all the rays. In taking a photograph of a heavenly body the photographic plate is placed at the eyepiece of the telescope where the observer would ordinarily be; and the clockwork is adjusted so that the instrument will move exactly with the object being "taken." Otherwise the photograph will be blurred, just as in ordinary photography when the object being "taken" moves.

Ordinary cameras have been used with good results without the telescope for taking photographs of larger sections of the heavens. See ASTRONOMY; TELESCOPE; LICK OBSERVATORY; YERKES OBSERVATORY.

Asuncion, *A soon"se on',* the capital of Paraguay, situated on the left bank of the Paraguay River, 970 m. above Buenos Aires. Many of the houses are only mud-walled cabins; the principal public buildings are religious edifices and government buildings. The city also has a national college, a hospital and a public library. The chief trade is in Paraguay tea, fruits, tobacco, hides and manufactured goods. Asuncion was founded in 1535, by Ayolas, and has been the scene of repeated revolutionary outbreaks. Population in 1919, estimated at 120,000.

Atahualpa, *Ah" tah wahl' pah,* (?-1533), the last of the Incas of Peru, the favorite son of Huayna Capac, who made him King of Quito and his older brother, Huascar, King of Peru. Early in 1530 the brothers waged war against each other, and the triumphant Atahualpa had Huascar imprisoned. Soon after, the Spaniards, under Pizarro, arrived and captured Atahualpa, who offered a huge ransom of gold to be released. When Huascar heard of this he offered still more advantageous terms for himself, whereupon Atahualpa had him assassinated. Pizarro, after the gold for the ransom of Atahualpa began to pour in, had his prisoner tried for plotting against him, and executed.

Atalan'ta, an Arcadian huntress distinguished for her beauty and daring. She had vowed to wed only him who should distance her in a foot race, but death, by a dart she carried while running, was to await all whom she outstripped. Notwithstanding this hard

condition, many had entered the contest, and the head of each one was fixed up along the racing course. Finally Hippomenes essayed a trial. From Venus he had previously obtained three golden apples, plucked from her garden in Cyprus. These, at intervals, he threw on the ground while running. Enticed by their glitter, Atalanta stooped and picked them up. Thus she lost her race. So absorbed were the lovers in their married happiness that they forgot to give due thanks to Venus. The offended goddess, therefore, caused them to anger Cybele, who turned them into lion and lioness and yoked them to her chariot.

Atchafalaya, *Ach"a fa li' a,* **River,** an outlet of the Red River, branching off from that stream where it enters the Mississippi, and flowing southward into the Gulf of Mexico at Atchafalaya Bay. Its length is 220 m., and it is navigable for steamers for most of this distance.

Atchison, Kan., a city and the county seat of Atchison Co., 20 m. n. of Ft. Leavenworth and about 49 m. n.w. of Kansas City, on the Missouri River and on the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe, the Missouri Pacific, the Chicago, Burlington & Quincy and other railroads. The river, which here forms the "Great Bend," is crossed by a fine steel bridge, about 1200 ft. in length. Location and transportation facilities have made Atchison an important supply center and one of the leading commercial cities in the state. Its manufacturing interests are extensive, embracing flour mills, corn-product and oatmeal mills, grain elevators, railroad car shops, foundries, lumber mills, brickyards and manufactories of carriages, harness, furniture and brooms. A large trade in grain, fruit and other agricultural products, lumber and live stock is carried on; and there is a large wholesale business in hardware, groceries and drugs. The leading institutions of Atchison are a state soldiers' orphans' home; St. Benedict's College and Mount St. Scolastica's Academy, both Roman Catholic; Western Theological Seminary; Midland College (Lutheran); and a public library. There are three parks, Central, Forest and City, and several noteworthy buildings, among them a fine courthouse and government building and a handsome union depot costing $140,000. Atchison was settled by pro-slavery partisans in 1854 and named for David Rice Atchison, a United States senator. It was chartered as a city in 1858. Population in 1920, 12,630.

Athabas'ka, Lake, situated in the northern part of Alberta and Saskatchewan, Canada, southeast of Great Slave Lake. It is about 230 m. long and averages 20 m. wide. It is fed by the Elk, Peace and Athabaska rivers, and Slave River provides an outlet into Great Slave Lake. The lake received its name from the Athabaska Indians inhabiting its shores.

Athabaska River, a river situated in Alberta, Canada, rising in the Rocky Mountains near Yellowhead Pass. It flows northeast in a winding course to Athabaska Landing and thence north into Lake Athabaska, a distance of 765 m. Its chief tributaries are the McLeod, Lesser Slave and Clearwater rivers. It is navigable for shallow-draught steamers.

Athana'sius, Saint (about 293-373), the eminent champion of the Nicene Creed, born in Alexandria. He received a Christian education and was a deacon at the time of the Council of Nicæa (325). Here he began his long struggle against Arianism, which lasted for half a century and resulted in the establishment of Athanasius' view, which had been officially adopted at Nicæa, that Christ was of the same substance, or essence, as God the Father. About the year 326 he was appointed Bishop of Alexandria, but the vicissitudes of the controversy were so great that he was banished five times, and more than one-third of his long episcopate was spent in exile. See NICÆA, COUNCILS OF; NICENE CREED; ARIUS.

Athapas'can, a group of Indian tribes whose language is practically the same. Here belong the Apache, Navaho, Chippewa, Lipan, Hupa, Jicarilla and Wai-

laki. Only the first two mentioned were warring tribes. Their territory originally extended from Alaska through Canada and as far down as Mexico. See APACHE; NAVAHO.

Ath'elstan (895-940), King of England, grandson of Alfred the Great, succeeded his father, Edward the Elder, in 925. He was crowned at Kingston in Surrey, being the first English sovereign to assume the title King of England. He enlarged his dominion, annexing all the previously independent states of the island except Scotland and Wales, and administered his government with great liberality and sagacity.

Ath'ens, the seat of government of ancient Attica, now the capital of modern Greece. It is situated about five miles from the sea and is built about a flat-topped rock 300 ft. high, called the Acropolis. According to tradition it was founded by Cecrops in 1550 B. C. and was called Cecropia, but the name was later changed to Athens in honor of its patron goddess Athene. It figures also in mythology as the city of the hero Theseus.

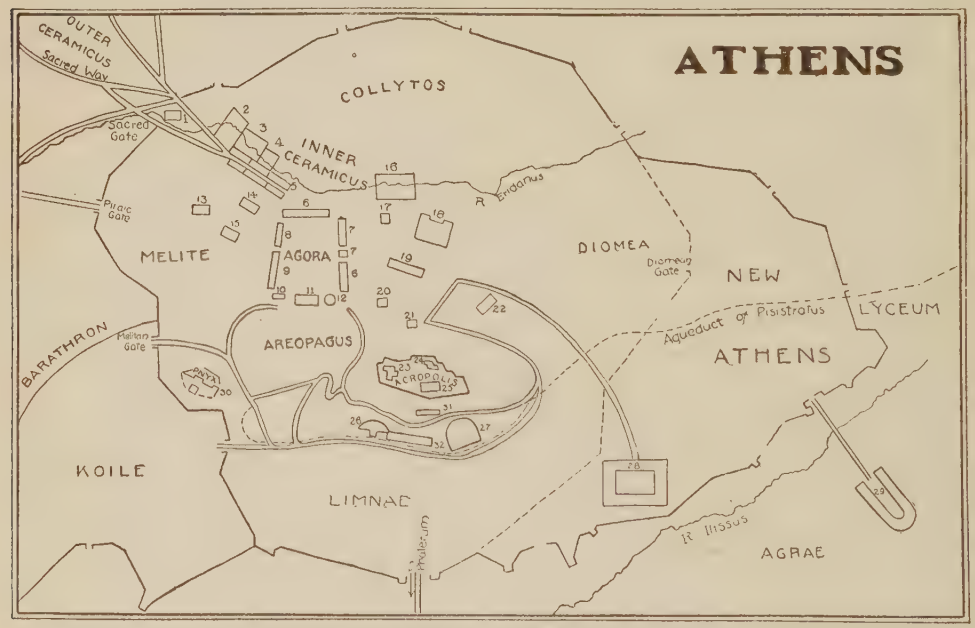
HISTORY. When Athens came into the light of history it was already the home of most of the free inhabitants of the state. The nobles were the ruling class, but they were not ruling a wholly contented people. Instead, the dissatisfaction was so pronounced that under the direction of a popular leader Cylon, the people demanded and received certain privileges previously granted only to the nobles. In 621 B. C., Draco, a member of the oligarchy, had the code of laws posted where all might read them, an act which, though doubtless a concession, gave the people an opportunity to discuss the laws and appreciate their harshness (See DRACO). Solon (594 B. C.) was chosen by the people to formulate new laws; his reforms were democratic in character, as he tended to base social importance in the state upon the income of the citizen rather than, as formerly, upon birth (See SOLON). But after Solon's death the struggle of the parties again began. Supported by the people, Pisistratus gave the city a mild and wise rule. Though he was the first tyrant of Athens, he used Solon's form of government, encouraged commerce, beautified the city and gave the estates of the banished nobles to landless freemen (See PISISTRATUS). His sons succeeded him and, on the whole, gave Athens a period of prosperity.

The people, however, were still at the mercy of their ruler; to remedy this, Cleisthenes, an exiled noble, returned and headed a reform party. Three evils remained to be eradicated: the government was still in the hands of the rich; jealousies existed among the various clans of the hill, the shore and the mountain; and trouble was continually arising between the real Athenian citizens and the metics, or strangers. Under Cleisthenes the power of the assembly was greatly enlarged; the old clans based upon blood relationship ceased to appear as political powers, their place being taken by the geographical units of deme and ward; and the metics became citizens with full rights and privileges. To prevent the growth of dangerous factions, Cleisthenes invented the device of ostracism, whereby once a year each citizen was given a chance to vote by ballot against any man he considered dangerous to the state. If 6000 votes were cast, the man receiving the largest number was exiled for ten years. Ostracism had no stigma of disgrace connected with it.

Persian Wars. Athens had thus secured peace within when she began to be molested from without. Her position in Greece was subordinate to that of Sparta, which had already bound the Peloponnesian states in a loose league and was famous for its military powers. But it was Athens that first drew upon herself the wrath of Darius, King of Persia, by generously sending 20 ships to the aid of the Ionians in 500 B. C., when they were rebelling against Persia. When the Ionians were subdued, Darius turned his attention to the punishment of Athens, and, after many disastrous attempts to reach Athens, finally met the Greeks, under

Miltiades, on the plain of Marathon, 20 m. north of Athens, and was defeated (See MARATHON, BATTLE OF; MILTIADES). For the next ten years Athens bent her energies to preparing for the third attack of the Persians. The aristocratic party, headed by Aristides, favored preparing to fight on land; Themistocles led the party which wished the navy developed, and fortunately the plan of Themistocles prevailed. Aristides was ostracized and Athens became the greatest naval power of Greece (See ARISTIDES; THEMISTOCLES). Though Darius had died, the Persians did not give up their ambition to conquer Greece, and under Xerxes the wars were renewed. During this war Athens was twice captured and pillaged, but the Persian army was at last completely routed at Platæa in 479 B. C.

Confederacy of Delos. At this same time the Ionian cities revolted from Persia and appealed to Sparta for aid. When she refused assistance Athens proffered her aid and soon advanced to the position of leader in fighting any common foe. The outcome was the Confederacy of Delos. Aristides, the Athenian leader who had returned from his year of ostracism, proposed a plan of union and assessed each ally the number of ships and men it should furnish and the tax it should pay each year. All the states agreed readily to his plan and his assessment, as they knew his honesty and trusted to his good judgment. An annual congress of deputies met at Delos, each member of the league having one vote; Athens was the leader, with her generals commanding the fleet and her delegates presiding at the congress. The



ATHENS

1. Pompeum. 2. Gymnasium. 3. House of Pulytion. 4. House. 5. Porticoes. 6. Stoa Poikile. 7. Stoa of Attalus. 8. Stoa Basileios. 9. Stoa. 10. Temple of Apollo. 11. Senate House. 12. Tholus. 13. Temple of Aphrodite. 14. Theseum. 15. Temple of Hephæstus. 16. Gymnasium of Ptolemy. 17. Theseum. 18. Stoa of Hadrian. 19. Market. 20. Sanct. of Dioscuri. 21. Prytaneum. 22. Diogeneion. 23. Propyleá. 24. Erectheum. 25. Parthenon. 26. Odeum. 27. Theater. 28. Temple of Zeus. 29. Stadium. 30. Place of Assembly. 31. Precinct of Asclepius. 32. Portico of Attalus.

purpose of the league was to drive the Persians from the Ægean.

The Athenian Empire. Cimon, the son of Miltiades, was the chief military hero. One Persian stronghold after another fell, until all the coasts and islands of the Ægean were freed from Persia. In 466 B. C. came the victory of Eurymedon, where Cimon in one day destroyed a Persian army and took a fleet of 250 vessels. The league now grew in numbers, and the rich commerce of the Ægean and even of the Black Sea poured into Athens. As the fear of Persia decreased, many cities preferred to pay more money rather than to furnish ships and men, and thus the fleet was almost wholly manned by Athenians. The allies grew indifferent to the meetings of the Confederacy and soon Athens no longer consulted them as to the management of military affairs. Those who refused to pay their tax were wisely forced to keep their engagements, since Athens saw that the Persians were kept away only by unremitting vigilance. Such states, when subdued, became dependencies of Athens, and before long even those which had not rebelled were treated in the same manner. The voluntary union of free states was thus gradually changed into an empire, with Athens as its ruler. There were no more meetings of the congress, the treasury was transferred to Athens, and the tribute exacted from the states was used to beautify the city. In return, however, the Athenians faithfully kept Persia from the Ægean.

Age of Pericles. The 50 years that followed marked the rise of Athenian culture and magnificence, and Athens became the center of the literary and artistic world (See PERICLES; GREECE, subhead *Period of State Supremacy*). The ancient city is chiefly remembered as it was at this time. The Long Walls from Athens to its harbor, Piræus, were completed, giving space where all might seek safety from invaders. The center of the architectural glory of Athens was the Acropolis, the citadel of earlier days, but at this time crowned with the most beautiful buildings of white marble. This

ATHENS

was approached only at the western side, and there ascent was by means of a grand stairway of 60 marble steps leading to noble colonnades and porticoes. In front of the entrance stood the colossal bronze statue of Athene, whose broad spear point caught the sun's rays and gave the distant mariner the first assurance that he was near the city. On the right stood the Temple of Athene Nike, wrongly spoken of as the Wingless Victory. Near the center were the two larger buildings, the Erechtheum and the Parthenon. The Erechtheum was a graceful temple whose celebrated Porch of the Maidens still stands to tell of its former beauty. The Parthenon, however, was the most lovely building of all. It was in Doric style, with low marble pillars, which, beneath the gable, rose only to a height of 34 ft. Its beauty was due, therefore, not to mass but to the perfection of its proportions and its delicate ornamentation. There were 50 life-sized or colossal statues in the gable, and 4000 sq. ft. of remarkably beautiful relief in the inner frieze. The sculpturing was done by Phidias or under his personal supervision, but without doubt his special tasks were the various statues of Athene. Within the temple stood his colossal statue of the goddess made of gold and ivory.

The great Theater of Dionysius, cut in a semicircle upon the rocky southeastern slope of the Acropolis, was large enough to seat the whole free population of Athens. Here, twice a year, during several days, the great dramatists presented their masterpieces. Through the efforts of Pericles the admission fee of any citizens asking for it was paid from the public treasury. This was money wisely expended, for the Greek theaters were planned for religious and intellectual training rather than for amusement. From all over Greece, artists, philosophers and writers thronged to Athens, for nowhere else was there such freedom of thought and such appreciation of artistic worth. Abbott, in his *Pericles*, thus speaks of the former glory of Athens:

"No description can give anything but a very inadequate idea of the splendor, the strength, the beauty, which met the eye of the Athenian, whether he walked round the fortifications, or through the broad streets of the Piræus, or along the Long Walls, or in the shades of the Academy, or amidst the tombs of the Ceramicus; whether he chaffered in the market place, or attended assemblies in the Pnyx, or loitered in one of the numerous porticoes, or watched the exercises in the Gymnasia, or listened to music in the Odeum or plays in the theaters, or joined the throng of worshipers ascending to the great gateway of the Acropolis. And this magnificence was not the result of centuries of toil; it was the work of 50 years."

Peloponnesian War. The rapid rise of Athens to the position of dominating power in Greece and the spread of her democratic ideas among the other Grecian states aroused the jealousy of aristocratic Sparta; her control of the commerce of the Ægean excited Corinth. These causes finally brought about open hostilities in 431 B. C., when Athens gave aid to Corcyra against her Mother Country, Corinth. Sparta, posing as the champion of Greek freedom, demanded that Athens set free her subject islands and thus give up her empire. To this Athens pointedly replied that Sparta should first set free Messenia and the conquered towns of Laconia. The superior military skill of the Spartans and the terrible plague which ravaged Athens combined to accomplish the final defeat of the city, though not until after years of warfare marked by many brilliant victories upon her part. The end came when at Ægospotami, in 405 B. C., Lysander, the Spartan, captured the last fleet that Athens could build. Athens had then to give up all claim to empire, could retain only 12 ships and promised to be the ally of Sparta in peace or war. The Long Walls were torn down to the accompaniment of flutes playing Spartan war music.

Medieval Development. Sparta maintained this control for only a brief period, and soon the Athenian democracy was restored and her Long Walls rebuilt, but in 338 B. C., with the rest of Greece, she came under the control of Philip of Macedon, and her history thereafter portrays a gradual though steady decline. Under Roman occupation her treasures were preserved and many of her historic buildings were repaired, but the city itself did not flourish. Later, under Turkish and Italian domination, the city dwindled to the miserable group of buildings found in 1835. The Parthenon was variously used as a Christian church, a Mohammedan mosque and even as an arsenal. The rise of modern Athens began when the city became the capital of the new Kingdom of Greece.

Modern Athens. At the beginning of the 19th century little of the glory of the Athens of the Age of Pericles remained. Her temples and beautiful public buildings had gone to ruin or been buried under the accumulation of the years. The diminishing population was housed in scarcely more than 300 houses of nondescript style, and the streets were unkempt and narrow. In 1835, however, the city was entirely rebuilt, chiefly under the direction of a German architect, Schaubert, who has made it one of the most attractive cities of the East. It lies almost entirely upon the north and east sides of the Acropolis and extends across the sloping plain that leads to Mt. Lycabetus, or Mount St. George. The two main business streets, Hermes and Æolus, terminate in a beautiful park known as Constitution Square. The palace lies somewhat apart from the city and is a dignified structure of Pentellic marble. Other modern and attractive public buildings are the university buildings with the national library attached, the Academy of Sciences, the Polytechnic Institute and the National Museum. There are also American, French and British schools. Pop. 1919, 167,479.

Athens, Ga., a city and the county seat of Clarke Co., about 73 m. n.e. of Atlanta, on the Georgia, the Central of Georgia, the Seaboard Air Line, the Southern, the Gainesville, Midland and

other railroads. It is an important cotton market and has various manufactures, including cotton and woolen goods, cottonseed oil, bobbins, hosiery, furniture and machine-shop products and fertilizer. The city is widely known as an educational center. It is the seat of the University of Georgia, founded in 1801; of the Georgia State Normal School (coeducational, 1891), affiliated with the university; of the Lucy Cobb Institute, for girls, founded by Gen. T. R. R. Cobb and opened in 1858; and there are besides several secondary schools, including Knox Institute and the Jeruel Academy. The city was founded in 1801 as the site of the state university. It is governed under a charter of 1872. Population in 1920, 16,748.

Ath'ol, Mass., a town of Worcester Co., 33 m. from Fitchburg and 26 m. n.w. of Worcester, on Miller's River and on the Boston & Maine Railroad and the Boston & Albany branch of the New York Central Railroad. The town contains a number of villages. It has suburban electric railways and manufactories of cotton goods, cotton warps, sewing silk, mechanical tools, pocket books, matches, silk, furniture, toys, boots and shoes, organ cases and billiard tables. Athol was settled in 1735 and called Pequoig until it was incorporated as a town in 1762. Population in 1920, 9,792.

At'kinson, Edward (1827-1905), an American economist and statistician, born at Brookline, Mass. He studied at Dartmouth College and became well known as a writer on subjects having to do with public affairs. He produced some of the campaign literature of 1900 dealing with the Philippine situation, which was then a conspicuous issue. His chief works are indicated by the following titles: *Labor and Capital, Railroads in the United States, Industrial Progress of the Nation, Cost of a National Crime* and *Science of Nutrition.*

Atlanta, Ga., the capital and largest city of the state, county seat of Fulton Co., 294 m. n.w. of Savannah, 171 m. w. of Augusta and on 14 radiating lines of railroad, most of which are included in the systems of the Southern, the Louisville & Nashville, the Seaboard Air Line, the Western & Atlantic, the Georgia, the Central of Georgia and the Atlanta, Birmingham & Atlantic railroads. The city is situated at the foot of the Appalachian Mountains, 1050 ft. above sea level, on a ridge which divides the watersheds of the Atlantic Ocean and the Gulf of Mexico, and its eminence gives Atlanta an invigorating atmosphere, with few extremes of heat or cold. There is a fine street-car system, with 196 m. of electric railway extending out of the city in all directions. The city limits, originally a circle with the old depot as the center, have been extended in every direction until the circle is practically obliterated, the city now covering an area of 26 sq. m., including the former suburbs of Edgewood, Druid Hills, Brookwood, or North Atlanta, Ansley Park, West End, Oakland City and East Atlanta. The important business streets are Peachtree and Whitehall, but business has rapidly extended over Broad and Forsyth streets, and a number of cross streets, between Ellis on the north and Mitchell on the south.

Parks and Boulevards. The principal parks are Piedmont, of 189 acres; Grant Park, named for its donor, L. P. Grant, of 140 acres; and Lakewood, of 390 acres, including 62 acres of water. The most important residence districts are Brookwood, Ansley Park, Druid Hills, Peachtree and West Peachtree streets, Washington Street, Capitol Avenue and Gordon Street. Ft. McPherson, four miles south of the city, now a regimental post, has been recommended by the war department as the site for a brigade post. The Oakland cemetery contains a monument to Confederate soldiers and one to the unknown Confederate dead, the latter a beautiful monument modeled after the *Lion of Lucerne.* West View cemetery has the tomb of Henry Grady and the monument to Lieutenant Brumby, who first raised the American flag at Manila.

Public Buildings. The most important buildings are the capitol, with ex-

terior of limestone and interior of Georgia marble; the courthouse, city hall, the Terminal Station, Federal Building and a Carnegie library. The Georgia Terrace Hotel is one of the most beautiful in the country. Other fine hotels include the Piedmont, Kimball, Ansley, Majestic and Aragon. Recently a large Auditorium, capable of seating 7000 people, was built.

INSTITUTIONS. Atlanta has a fine system of public schools, with 25,000 pupils enrolled. In higher institutions it has 8000 students. The Georgia School of Technology stands at the head of the educational system. Other important institutions include the Atlanta College of Physicians and Surgeons, Atlanta School of Medicine, Southern Dental College, Atlanta College of Pharmacy, College of Eclectic Medicine, Agnes Scott College, Cox College, Atlanta Theological Seminary, Washington and Spellman seminaries, Atlanta Baptist College, Atlanta University, Morris Brown College, Clark University and five institutions for negroes. The benevolent institutions include the new Grady Hospital, one of the best-equipped institutions of its kind in the country. Many private hospitals also take high rank. The Confederate soldiers' home is located in the suburbs near Grant Park.

COMMERCE AND INDUSTRY. Atlanta is the foremost manufacturing city of the state. The records of the Atlanta Credit Bureau show that of 150,000 merchants in the Southeastern States, 100,000 of the number have purchased goods in Atlanta during the last few years. The manufacturing industries included in the census of 1910, 548 establishments in the county, of which 485 were in the city, with a total product of $40,000,000. The present output exceeds $75,000,000 annually. The bank clearings of Atlanta in 1917 were $1,605,493,790. The wholesale trade of the city is about $400,000,000.

HISTORY. In 1833 Atlanta was a small town called Terminus, taking its name from the junction of two railroads. In 1843 a town charter was secured and the name changed to Marthasville. In 1847 a city charter was granted and the name changed to Atlanta. During the Civil War Atlanta was an important depot of supplies for the Confederacy and thus became the objective point of General Sherman's attack. After a long siege and three battles, Atlanta was occupied by General Sherman, by whose order, in November, 1864, the city was burned. Atlanta was rebuilt rapidly after the war and became the state capital in 1877. The Cotton Exposition in 1881 and the International Exposition in 1895 did a great deal to stimulate the city's growth. Population in 1920, 200,616.

Atlantic Cable. See CABLE, SUBMARINE.

Atlantic City, N. J., a city and noted pleasure and health resort of Atlantic Co., 56 m. s.e. of Philadelphia and 96 m. s.w. of New York, on the Atlantic Ocean and on divisions of the Reading and the Pennsylvania railroads known as the West Jersey & Seashore and the Atlantic City railroads. Atlantic City is situated on a narrow island called Absecon Beach, extending from Great Egg Harbor on the southwest to Absecon Inlet on the northeast. The island is ten miles long and has one of the finest bathing beaches on the Atlantic coast. Absecon Lighthouse at the northern end of the island is 160 ft. high. Interurban electric lines connect the city with Ventnor, Margate and Longport on the island, and other towns along the coast. The city has a great number of fine hotels, boarding houses and private cottages and is one of the most popular all-the-year-round resorts in the United States. A fine board-walk stretches along the beach for nine miles, and six long piers extend from the walk into the ocean. There is also a broad driveway called Atlantic Avenue and an automobile boulevard.

Atlantic City contains several seaside sanitariums, the city hospital, Mercer Memorial Home for invalid women and the Children's Seashore Home. The city has few industries, oyster dredging and shipping being the most important.

A few settlers came to the site in 1780, but the existence of the city dates from the completion of the railroad in 1854, when the name of Atlantic City was first adopted. The transient population varies, but during the summer it is estimated at between 300,000 and 450,000. Resident population in 1920, 50,682

Atlantic Coast Canal (Proposed). The beginning of construction in 1910 on the Cape Cod Canal, which meant much to commerce between New York and Boston, served to emphasize the importance to coastwise trade of inland waterways which should facilitate commerce between New York and the South. Plans for such a waterway have been formulated by government engineers; and in 1910 estimates were made for that section of it which would connect New York with Philadelphia. Few engineering difficulties exist in this section, which would require excavation for 30 m. across New Jersey and dredging for 25 m. to deepen the channel of the Delaware River. The total cost of this work was estimated at $38,725,000. Extensions would probably be feasible southward to Key West and thence along the Gulf to New Orleans.

Atlantic Ocean, that part of the water envelope of the earth which lies between Europe and Africa on the east, and the two Americas on the west. It has no well-defined boundaries on the north and south, but may be said to end at the Arctic and Antarctic circles. Its name is probably derived from Atlas, and was given by the ancients because it lay beyond Mt. Atlas in northern Africa. Next to the Pacific, the Atlantic Ocean is the largest body of water on the globe. From north to south it measures 9000 m.; in breadth it averages 3000 m. Its narrowest place is between Cape Palmas, Africa, and Cape St. Roque, South America. The protrusions of the two continents, of which these projections of land form a part, divide the Atlantic into two basins, a North and a South Atlantic.

The principal islands in the Atlantic are the British Isles in the east, Greenland, Iceland and Newfoundland in the northern part and the West Indies near the central part. Four arms of the Atlantic extend inward and form great inland seas, the Mediterranean and Baltic seas on the eastern side and Hudson Bay and the Gulf of Mexico on the western side, while numerous seas and bays constitute other divisions of its waters; the North Sea, the Bay of Biscay and the Gulf of Guinea on the east, the Caribbean Sea and Baffin Bay on the west, and on the north the Greenland, Barents and the Kara seas, which, while not completely surrounded by land, yet are separated from the main body. Through these branches the Atlantic receives most of the drainage of the continents which form its boundaries. The average depth of the Atlantic is about 13,000 ft. It is deepest near the Island of Porto Rico, where soundings of 27,366 ft. have been made. A ridge extending from north to south, about midway between the eastern and western continents, marks its shallowest part, averaging 6500 ft. in depth. In the South Atlantic this submarine elevation is known as the Challenger Ridge. In the North Atlantic another plateau extends east and west from the Hebrides to Newfoundland. On this ridge is laid the trans-Atlantic cable. The greatest depths of the Atlantic exceed the altitude of the highest peaks in the Rocky Mountains and the Andes.

The North and South Atlantic have two circulatory systems. The Gulf Stream flows from the Gulf of Mexico northward, branching above 70° north and moving northward then southward, bathing the western shores of the British Isles (See GULF STREAM). The Greenland and Labrador streams flow southward. The South Atlantic has one great circulatory system, which moves north along the west coast of Africa, west across the ocean to the eastern shores of Brazil, where it divides into two branches, one moving northward toward the Gulf Stream, the other continuing a revolutionary movement, flowing south and east. The two large tracts of comparatively still water lying within the circles described by the currents of the North

and the South Atlantic are called Sargasso Seas. See SARGASSO SEA; CURRENTS, MARINE; TIDES; TRADE WINDS.

At'las, in myths, one of the race of Titans who warred against Jupiter. As punishment, he was forced to hold on his shoulders the weight of heaven and the stars, standing forever in the western part of Earth, near the Pillars of Hercules. He granted rest and food to

ATLAS

Perseus, one night, and that god, wishing to return some kindness, held before Atlas the Medusa head, which turned him into stone; thus Atlas no more felt the burden on his back. According to other accounts Atlas was turned into a mountain because of inhospitality to Perseus.

Atlas Mountains, a system in northern Africa, extending in a line parallel with the Atlantic and the Mediterranean coasts, from the western end of Morocco to the eastern part of Tunis. There are two divisions, the Moroccan and the Algerian Atlas. To the former belong the three ranges, the Great Atlas, the Little Atlas and the Anti-Atlas. The highest summits are the Jebel-Ayashin (14,600 ft.) and Tamjurt (14,500 ft.). The loftiest peaks are snow-clad, except during a brief part of the summer. Among the deposits are marble of different varieties, copper, salt and iron.

Atmosphere, the invisible gaseous envelope which immediately surrounds the earth. The term is used much as the word *ocean* is used to designate that part of the earth's surface which is composed of water. The atmosphere is composed of air.

COMPOSITION. The chief gaseous constituents of the air are oxygen and nitrogen, the percentage of the former being 21, that of the latter 78; while argon and carbon dioxide are the chief of the several remaining chemical substances. Such is the composition of *dry air*. But the air contains more or less moisture, the proportion of which varies from nearly zero to five per cent. There are also besides the essential constituents of air myriads of minute solid particles of matter, ordinarily divided into two classes, inorganic and organic, the former being particles of dust, such as are seen floating in a beam of light in a dark room; the latter, the minute, usually microscopic germs or microbes of living organisms. The atmosphere is not a chemical, but a mechanical composition; that is, its several gases do not unite to form a third gas, but each maintains a separate existence, its particles fitting into the interstices between the others; and each gas in the absence of all the others would constitute a thin atmosphere of itself. The color of the atmosphere is due to its reflection of blue light rays from the sun.

VOLUME. The volume of the atmosphere is not known, since its outer limits have never been ascertained. These limits are so indefinite as to be beyond the possibility of exact measurement. Observations on twilights have shown that

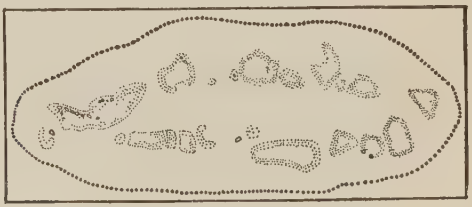
the reflection to which they are due depends upon 45 m. of air; and meteors, which are supposed to owe their luminosity to contact with the earth's atmosphere, have been observed at a distance of 100 m. above the surface. Again, observations on the aurora lead to the suspicion of a much greater height, since these phenomena, which can hardly take place in a vacuum, sometimes occur at a height of 300, 400 and 500 m.

Pressure. The downward pressure of the atmosphere, or weight, is the result of the aggregate weight of all the overlying air. This pressure is greatest at sea level, being practically 15 lb. to each square inch of surface. By multiplying this quantity by the number of square inches on the earth's surface, the entire mass of the atmosphere is found to be five thousand millions of millions of tons. As we ascend above sea level, this pressure decreases, though the rate of decrease is not uniform. It has been estimated that one-half of the total weight of the atmosphere is limited to the first three miles above sea level. This is due to the greater density of the lower air. The gaseous, and therefore elastic, nature of the atmosphere and the heavy pressure due to gravity cause the air to become compressed; thus the amount of air at sea level occupying a cubic foot of space is much greater than that occupying the same amount of space at a greater elevation. For this reason the air is thin at high altitudes and dense, or thick, at low. The fact explains why the pressure does not decrease in exact ratio with altitude. See Barometer.

Properties. An important physical property of the atmosphere is its power to absorb, radiate and transmit heat. Its heat is derived from several sources, but chiefly from the sun. The amount of absorption of which the air is capable is assumed to be at least 40 per cent of the total energy of the sunbeam. Because of this absorption the atmosphere acquires a considerable amount of heat which it is slow to lose. In the temporary absence of the sun's rays from the hemispheres, the air envelope serves as a blanket, preventing the escape of the earth's heat by radiation and imparting its own radiant heat, thus equalizing the temperature of day and night and of the seasons, and thereby moderating weather and climate. It is probable that in the absence of the terrestial atmosphere the radiation of the earth's heat would leave that planet several hundred degrees below zero. The temperature of the air is measured with the thermometer, which records heat variations not perceptible to sense. Thermal variations are less in the equatorial regions than elsewhere on the globe. See Thermometer.

Another important property of the atmosphere is its power to reflect and refract light. By refraction it causes the sun to appear above the horizon when in reality it is below. This refractive power serves to lengthen the period of sunlight about four minutes at the equator, and to provide long periods of twilight to polar regions which would otherwise be in darkness. See Wind; Cloud; Humidity; Air; Rain.

Atoll', a coral reef, circular in form, enclosing a small body of shallow water, commonly called a lagoon. It is not continuous so as completely to surround



ATOLL

the lagoon, but may be broken in one or more places, forming an opening connecting the two bodies of water. See Coral.

Atom, as originally defined the smallest particle of matter that can exist alone. The name itself means indivisible and was applied as long ago as 492 B. C. by Empedocles, a Greek philosopher; it was further defined by Dalton in 1803. The name is still retained although much discussion has attended the term, and at present the atom is held to be divisible. We now think of atoms as consisting of

numerous corpuscles, or ions, of negative electricity held together by a coating of positive electricity. The modern theory furnishes a reasonable explanation of chemical affinity by considering that two elements which tend to unite do so because one lacks one or more ions of negative electricity necessary to neutralize its positive coating, while the other possesses the same number more. Atoms are invisible even with the most powerful microscope, and can be separated from each other only by chemical means; recent experiments have shown that they cannot be smaller than 1/50,000,000 of a millimeter. The electrons are so much smaller that we are led to wonder if they may not be purely imaginary; we learn, however, that their speed has been measured, the relation of the electric charge of an electron to its mass may be found and that even the mass of the electron itself has been determined. All of the atoms of one element correspond, especially in weight, and are unlike those of any other element. In a compound the atoms of one element are understood to have united with those of another and to be held together by an attractive force called cohesion. See ATOMIC THEORY; DALTON, JOHN; CHEMISTRY; COMPOUND; ELEMENT; MOLECULE.

Atom'ic Theory, a principle stated by Dalton in 1808, which relates to the combining of atoms of elements to form compounds. Dalton's Theory, which has formed the basis of chemical work since his time, claimed that the atoms of different elements differ in weight. By means of the hypothesis that one atom of one element unites with one atom of another to form the simplest compound of the two, and taking the weight of the hydrogen atom as one, he calculated, by a simple proportion, the weights of the atoms of many elements. His computations were not accurate, but his law held good, and the atomic weights of the elements have since been figured with greater accuracy. At present the weight of the oxygen atom is generally used as the standard, since oxygen combines with almost all elements. The statement of this theory justified the law that a compound is always made up of the same parts by weight, of the same elements; and gave rise to another, that if two elements unite to form two different compounds, the ratio of the weights of the elements in one compound is always a multiple of their ratio in the other. For example, hydrogen and oxygen unite to form the two compounds, water and hydrogen peroxide; the ratio of the weight of the hydrogen to the oxygen in the first is $\frac{1}{8}$, in the second, $\frac{1}{16}$.

The matter of the divisibility of the atom, which is at present being widely discussed, does not affect the atomic theory nor the laws depending upon it as long as the atom is considered the smallest particle which unites with others in the molecule to form compounds.

Attach'ment, in law the name of an order of the court and the process by which an officer of the law takes possession of the person or property of the person named. The writ of attachment against property is frequently employed to secure payment of debts overdue and to prevent fraudulent disposal or concealment of property before judgment against it can be satisfied. The writ against the person has practically been abandoned in the United States.

Attain'der, the legal consequence of a sentence of death or outlawry, by which the person sentenced is deprived of the right of inheriting property and transmitting it to others. The sentence resulting in attainder is pronounced against those convicted of felony or treason. Under the British Government persons were formerly "attained" by special act of Parliament, and their descendants were likewise "attained." In the United States bills of attainder extending beyond the life of the person "attained" are prohibited by the Constitution.

At'tar of Roses, an oil made from the petals of certain varieties of roses. It requires about 100,000 roses to make an ounce of oil. The oil is manufactured in Cashmere, Damascus and several places in India, where extensive rose farms are maintained. The pure oil has

tints of green, yellow and red; it has a strong penetrating odor and is extensively used in the manufacture of Cologne and other perfumes. See PERFUMES.

Attention, the focusing of the mind upon one out of many impressions present in the consciousness. At any one moment many things are present in our consciousness; out of these one lies at the focus and is holding our attention, but in the background, or in the margin of consciousness, lie many other little-noticed impressions of which we are at best only subconscious. Attention is the attribute which separates the focus of consciousness from the margin. In children this ability is not highly developed, and a distraction upon the margin is easily brought to the focus, only to be soon replaced by another; hence allowances must be made for them in this respect.

The power of neglecting the margin for the sake of the focus, or concentrating the attention, is a valuable attribute, which varies greatly in individuals. An accountant can rapidly and accurately add a column of figures in the midst of a buzz of conversation and in spite of the distracting strains of the street band. The observant person, on the other hand, can rapidly bring occurrences from the margin to the focus. Possibly the most desirable state is that of the person who can retain a margin of consciousness which is sensitive and yet focus both rapidly and clearly.

Psychologically, attention has been divided in various ways. According to its direction it is said to be sensorial, that is, directed toward some object perceived by the senses; or mental, that is, directed toward some phase of the mind. It is said to be immediate if the object which attracts it is interesting through itself alone, or derived if the object is interesting through association with other interesting things. Finally, it is voluntary or involuntary, according to whether or not effort was required to fix the mind upon the object.

The prime element of attention is interest, and uninteresting things never hold the mind. Uninteresting things, however, may attract the attention when seen from some new point of view, and they then become interesting. A cultivated mind can give attention to things that to other minds are dull, only because it can find more phases in which to view them. Of the many factors which enter into the fixing of the attention the two most important are the condition of the health and the quality of the stimulus. In illustration of the first we all know how much more easily we work early in the day when the brain is fresh, or how much less effort is required to hold our attention to a subject when we are well. In the second case, a strong stimulus always attracts; as a sharp peal of thunder takes the attention from the most fascinating story. Attention, however, cannot be held continuously if the stimulus remains unchanged. Our senses cease to perceive it and effort is necessary to restore it. Thus, the ticking of a clock becomes inaudible; or a picture gazed at fixedly disappears from view. In the same way the nervous system tires and the attention fails. It may be rested by voluntarily redirecting it or involuntarily letting it roam for a time, guided only by objects that freely attract it.

At'tila (about 406-453), King of the Huns. He became joint king with his brother Bleda in 434, but soon thrust his brother aside. His army was increased by various Teutonic tribes, and in a short time his vast empire extended from the Rhine to the boundaries of China. He overcame Theodosius in several encounters and overran Greece and Macedonia. Constantinople was saved by its strong fortifications. In 451, when he invaded Gaul, he was met and defeated at Châlons by the combined Roman and Visigothic forces under their respective leaders, Aëtius and Theodoric. Attila retreated, but raised another army by the next year and made an excursion into Italy. Rome was on the eve of destruction, when Pope Leo I saved the city by an interview with the barbaric chief. In 453, as Attila was preparing to invade Italy again, he died and was secretly bur-

ied. He is described as a true Mongol, short of stature, with a large head and small, bright eyes.

At'tleboro, Mass., a town of Bristol Co., 31 m. s.w. of Boston and 12 m. from Providence, on the New York, New Haven & Hartford Railroad. The villages of Attleboro, North Attleboro and Attleboro Falls are within the corporate limits of the town. It has gold and silver refineries and smelting works and manufactories of chairs, silverware, buttons, electroplate, jewelry and jewelers' supplies, shuttles, coffin trimmings, carriages, yarns, cotton goods, cotton-goods machinery, etc. There are also large dyehouses and bleacheries. The town contains the Attleboro Home Sanitarium and has a public library. It was settled in 1669 and named from Attleborough, England. It was incorporated as a town in 1694. Population in 1920, 19,731.

Auber, *Ō″ bar′,* **Daniel François Esprit** (1782-1871), a French composer, principally of operas, born at Cæn, France. He was a pupil of Cherubini, whom he afterwards succeeded as director of the Conservatory. He produced a large number of charming operas of the light and vivacious kind, displaying marked individuality. The best known are *Fra Diavolo, Haydée* and *Masaniello.*

Au'burn, Me., county seat of Androscoggin Co., 34 m. n. of Portland and 31 m. s.w. of Augusta, on the west bank of the Androscoggin River and on the Maine Central and Grand Trunk railroads. The river, which falls 60 ft. near this place, separates Auburn from the city of Lewiston. The town has extensive manufactures of boots and shoes, spools, shuttles, boxes, carriages, cotton goods and furniture; abundant water power is supplied by the Androscoggin River. Many points of interest are in the vicinity, notably Lewiston Falls, Poland Springs and Lake Auburn. Auburn is an old town and has an interesting history. Its territory is a part of a tract of land originally known as Bakerstown, granted by the General Court of Massachusetts in 1765. It was settled as early as 1786, incorporated as a town in 1842 and as a city in 1869. Population in 1920, U. S. census, 16,985.

Auburn, N. Y., a city and county seat of Cayuga Co., 25 m. s.w. of Syracuse, 31 m. s. of Oswego and 173 m. n.w. of Albany, on an outlet of Owasco Lake, and on the Lehigh Valley, the New York Central & Hudson River and the New York, Auburn & Lansing railroads. Interurban electric lines connect with Rochester and Syracuse and the intervening towns and villages. The city is known as a popular summer resort on account of its location in the superb lake country in the heart of the Empire State, being near lakes Owasco, Skaneateles, Cayuga and Ontario. Many parks, hotels and cottages are found on the shores of all these bodies of water. Auburn, which has an area of nine square miles, is attractively situated and has broad and well-kept streets with a profusion of shade trees and many elegant residences. There is a bronze statue of William H. Seward, who made his home here and was buried in Fort Hill cemetery.

INSTITUTIONS. Auburn is the site of a state prison, one of the largest in New York State. There is also a prison for women in connection with this institution. The city contains a fine city hall, a county courthouse, United States Government Building, orphan asylum, several hospitals, the Burtis Auditorium and a state armory. The educational institutions include the Auburn Theological Seminary (Presbyterian), founded in 1819, the Robinson School for girls, several public libraries and the Seymour Library housed in the Case Memorial Building. The Women's Educational and Industrial Union Building, a handsome structure, erected in 1907, for the education of working girls, was the gift of Mrs. D. M. Osborne.

INDUSTRIES. Auburn is known as a prosperous city and has important manufacturing and industrial interests. The largest establishment is a manufactory of agricultural implements which exports its goods to every part of the world. There are numerous other large

plants, which include manufactories of steam-traction and portable engines, motors, worsted and woolen goods, monuments, mica, leather goods, carpets, rugs, delivery and dump wagons, carriages, drop forgings, oil cups, silk goods, thermostats, awnings, tents, rubber stamps, flour, pianos, buttons, thread, twine and cordage, electrical supplies, fine shoes, carpenters' tools, gloves and mittens, confectionery, tobacco and cigars and machine-shop products.

HISTORY. The first settlement was made in 1793 by Capt. John L. Hardenburgh and the place was known as Hardenburgh's Corners. The name was changed to Auburn when it was made the county seat in 1805. A city charter was granted in 1848. Population in 1920, U. S. Census, 36,192.

Audubon, *Aw' du bon,* **John James** (1780-1851), an American naturalist of French descent, born at Mandeville, La. He was educated in America and in France, studying painting for a time under the French artist David. On returning to America he settled in Pennsylvania, where he accumulated a large collection of birds and plants; and in 1808 he removed to Kentucky, continuing his researches. In 1826 he exhibited in England a noteworthy collection of colored plates of birds, and it was there that he published his well-known work *Birds of America.* He returned to this country in 1829 and subsequently published the *Ornithological Bibliography* prepared in conjunction with William McGillivray. The last years of his life were spent at Minniesland (now Audubon Park), New York, and here he produced *The Quadrupeds of North America* in collaboration with Dr. Bachman. His work is remarkable for painstaking accuracy and for the wide range which his observations covered. The Audubon Society for the study and protection of birds is named for him.

Audubon Society, The, an organization having for its purpose the protection of our common birds from destruction by disseminating knowledge about them and creating a sentiment against wearing birds' feathers for ornament. Audubon societies exist in nearly all states, and their combined membership exceeds 60,000. The society has issued hundreds of thousands of circulars and has been largely influential in securing the adoption of the bird law of the American Ornithological Union in all the New England States, Arkansas, Delaware, Florida, Illinois, Indiana, Kentucky, Ohio, New Jersey, New York, Wisconsin and Wyoming. This law forbids killing at any time birds not considered game birds. *Bird Lore,* a bimonthly magazine, is the official organ of the society.

Auerbach, *Ou' er bahk,* **Berthold** (1812-1882), a German novelist, born in Nordstetten. The philosophy of Spinoza caused him to turn away from Jewish orthodoxy, and he gave up his study for the ministry and turned to literature. His stories of peasant life made him famous. Best known are his *On the Heights, Edelweiss, Village Stories Told of the Black Forest, Villa on the Rhine* and *Master Bieland.*

Augeas, *Aw je' as,* a King of Elis. He had 3000 oxen in a stable which had not been cleaned in 30 years. One of the 12 labors of Hercules was to cleanse this accumulation. He accomplished the feat by turning through the stalls the rivers Alpheus and Peneus.

Augsburg, *Ouks'boork,* a city of Bavaria renowned for its Golden Hall, its beautiful churches and cathedrals, which date from the Middle Ages, and as an important commercial center of former times. The city also contains a number of beautiful modern buildings, among them a library, a theater, and a gallery of famous paintings. The leading industries include the manufacture of cotton and woolen goods, machinery and chemicals. A Roman colony was established here by Augustus in 12 B. C. In 1276 Augsburg became a free city. During the Reformation there assembled here, in 1530, the Diet before which was read the celebrated formula of Protestant belief known as the Augsburg Confession.

Augsburg was incorporated with Bavaria in 1806. Population, about 90,000.

Au'gury, among the Romans, sacred foretellings of events and announcements of divine will. These were determined by omens such as thunder, lightning and shooting stars; by the movements of birds; by the feeding of sacred chickens; by the appearance of various quadrupeds; and by incidentals called *diræ*. These might be the spilling of salt, stumbling, sneezing or hearing strange noises. Auguries were taken before all important projects. The practice was replete with deceit and was calculated to dupe the masses, while furthering the ambitions of leaders among them. By the mere words *alio die* (on another day), the augurs used to scatter large crowds. Important civil meetings could not be held if the omens were unpropitious. Momentous State transactions were considered void if the augur said that auspices taken previously had been irregular. Augury was of Etruscan origin. Romulus is popularly supposed to have instituted the first three augurs.

Au'gust, the eighth month of the year, containing 31 days. The month was named in honor of the Roman Emperor Augustus Cæsar. This month was chosen to honor his name because it was the month in which great good fortune had several times come to him. The month contained only 30 days at the time it was named for him, while July, named in honor of Julius Cæsar, had 31 days. In order to make certain that Augustus would be equally honored with Julius, the Senate decided to take a day from February and add it to August. See FEBRUARY; MONTH; YEAR.

Augusta, Ga., a city and county seat of Richmond Co., at the head of navigation on the Savannah River, 171 m. e. of Atlanta, 137 m. n.w. of Charleston and 132 m. n.w. of Savannah, on the Central of Georgia, the Charleston & West Carolina, the Southern, the Atlantic Coast Line, the Georgia, the Augusta Southern and other railroads. A line of steamers connects the city with Savannah, and electric lines extend throughout the city and to Aiken (S. C.). A bridge connects North Augusta and Hamburg (S. C.), two popular residential suburbs. Climatic conditions serve to make Augusta a noted winter resort, and gigantic hotels crown the hilltops around the city. The Hotel Bon Air in Summerville, a near-by suburb, and the Hampton Terrace, in North Augusta, are well-known tourist hotels. Pure water is supplied from the Savannah River.

PARKS AND BOULEVARDS. The city is laid out in broad, rectangular streets which are well paved and shaded with oaks and elms. May Park, of about 11 acres, and Allen Park are the largest of the city parks. City Hall Park contains a monument to the Georgia signers of the Declaration of Independence.

PUBLIC BUILDINGS. The noteworthy buildings include the county courthouse, Federal Building, a public library, Masonic Temple, Merchants' Exchange, Odd Fellows' Hall, nine banks and substantial business houses. A United States arsenal, the only one south of Philadelphia and east of San Antonio, was established here in 1827. There are about 35 churches embracing all religious denominations.

INSTITUTIONS. The educational institutions include the Georgia Medical College, a branch of the University of Georgia, located at Athens; St. Mary's and Sacred Heart academies; Paine's Institute (colored); Houghton Institute endowed in 1852 and free to all the children of Augusta; a girls' and boys' high school; about twelve public schools, of which eight are for whites and four for negroes. The John Milledge School is considered one of the best grammar schools in the South. Among the benevolent and charitable institutions are the Louise King Home, Augusta Orphan Asylum, a city hospital and Lamar Hospital (colored).

INDUSTRIES. Augusta ranks second among the cities of Georgia in commerce and manufacturing. The city is the second largest inland cotton market in the world, the annual cotton receipts averaging about 400,000 bales. Cow peas are

also extensively raised. There are large shipments of lumber, fruit and vegetables. The principal manufactures include cotton goods; about 13 cotton mills are located in and near the city. There are brickworks, fertilizer works, lumber, sash, door and blind plants, railroad-repair shops, a silk mill, veneer works and manufactories of other diversified products. Most of the mills and manufactories secure their power from a municipally-owned canal which supplies power at low cost.

History. The first settlement was made in 1736 by order of Gen. James Edward Oglethorpe, the founder of Georgia, who had a fort built commanding the river. It was first called King's Fort, but on a visit here in 1739 General Oglethorpe named it Ft. Augusta in honor of the Princess Augusta of Saxony. The trading post was soon recognized as an important commercial center, and merchandise was brought in boats from Savannah and distributed from this point. Augusta is noted as the home of Eli Whitney, the inventor of the cotton gin, and of the inventor James Longstreet. From 1786 until 1795 Augusta was the state capital. A city charter was granted in 1817. Population in 1920, U. S. Census, 52,548.

Augusta, Me., capital of the state and county seat of Kennebec Co., 62 m. n.e. of Portland and 75 m. s.w. of Bangor, on the Kennebec River, 40 m. above its mouth, at the head of tidal navigation, and on the Maine Central Railroad, which here crosses the river by a bridge 1100 ft. long. The Augusta, Winthrop & Gardner electric railway also connects the city with neighboring places, and the water communications afford excellent facilities for trade and travel. The most extensive products are lumber, cotton goods, pulp, paper, boots and shoes, and sash and blinds. Among the noteworthy buildings are the capitol, the Maine Insane Hospital, public library and a United States arsenal. Augusta was first permanently settled in 1754 by colonists from Massachusetts, and was incorporated under the name of Hallowell. The name was subsequently changed to Augusta. In 1831 it became the capital of the state and received its city charter in 1849. Population in 1920, 14,114.

Au'gustine, Saint (354-430), the name generally applied to Aurelius Augustinus, an eminent father of the Latin Church, born in Numidia, in North Africa. His father was a pagan nobleman, his mother, a woman of tender and devout Christian piety. His father spared no expense in training him for the brilliant career of a rhetorician, for which he studied at Madaura and Carthage. He was of a passionate nature, and his youth was marred by the gay vices of the age. At the age of 19 the spirit of speculation was aroused within him, and he started on that long and earnest search for truth which led him, first into Manichæism, and then through Neo-Platonism into Christianity. During the ten years in which he was passing through this experience, he completed his education and engaged in teaching rhetoric in his native town of Tagaste, in Carthage, in Rome, and finally in Milan, whither he went about the year 384. Here he came under the influence of Ambrose, and was converted to Christianity in 386.

Augustine now spent several years in retirement, after which he went to Hippo in North Africa, where he was ordained presbyter, and where he remained for more than 35 years, until his death, becoming coadjutor to the bishop in 395 or 396, and finally succeeding to the bishopric. During this long period of service his life was given up to his ecclesiastical labors and his voluminous writings. He was at the forefront in the religious movements of his time, and was a champion of the Church in the great controversies of the age, in connection with which some of his important writings appeared. Others of his best-known works, however, did not belong to his controversial writings, and include *The City of God* (*De Civitate Dei*), his *Confessions* and *The Trinity* (*De Trinitate*). In addition to these works about 400 of his sermons are extant.

Augustine's writings have exercised

the most profound influence upon the Christian Church in all of its branches. He crystallized the theological thinking of his age and dominated the course of theology for a thousand years. At the time of the Reformation Catholics and Protestants alike appealed to his authority. His doctrines of predestination, election and re-probation reappeared in Calvin. His intellectual vigor, deep Christian experience and earnest devotion to the welfare of the Church, coupled with his long service and epoch-making writings, give him rank among the greatest of the Church Fathers.

Augustine, or **Austin, Saint** (?—about 613), first Archbishop of Canterbury. He was selected by Pope Gregory I, with 39 other monks, to win the Anglo-Saxons to Christianity and to establish Catholicism in Britain. In 597 King Ethelbert and a large number of his followers were converted and baptized through the efforts of these early missionaries. Pope Gregory showed his appreciation by directing the consecration of St. Augustine as Archbishop of Canterbury.

Augus'tulus, Romulus, the last Emperor of the Western Roman Empire. His real name was Augustus, the diminutive Augustulus being applied on account of his youth and weakness of intellect. He was the son of a Pannonian, Orestes, who, aided by the barbarian troops, deposed the Emperor Julius Nepos and placed Augustulus on the throne (476). In the same year the barbarians under Odoacer overcame Orestes and deposed Augustulus, who retired to Naples.

Augus'tus (63 B. C.-14 A. D.), the first Emperor of Rome. Originally named Caius Octavius, he was called Caius Julius Cæsar Octavianus after his adoption by his great-uncle, Julius Cæsar; by decree of the Senate in B. C. 27 the title of Augustus was bestowed upon him, by which he is chiefly known in history. While quietly studying in Illyria he learned of his uncle's assassination, whereupon he crossed over to Italy. By his shrewdness Octavius soon held a foremost place among the competitors for power. He joined forces with Mark Antony and Lepidus, forming the Second Triumvirate, and the Roman world was divided among these three men. Octavius became master of the West, Antony of the East, and Lepidus was assigned Africa. Octavius and Antony soon thrust Lepidus aside and ruled the world between them. Antony's infatuation for Cleopatra (See CLEOPATRA) shocked the Roman sense of decency and led Octavius to engage in war with him (See MARK ANTONY). Following the defeat of Antony at Actium in 31 B. C., Octavius returned to Rome in 29 B. C. to receive a splendid triumph. He declared a general amnesty and soon brought back prosperity to Italy. In 27 B. C. he laid down his office of triumvir and the Senate conferred upon him the title Augustus (the venerated). The empire was now firmly established, though republican forms were observed as far as possible.

Augustus now carried on successful wars in Gaul, Spain, Asia and Africa. He did not try to add to the empire, but endeavored to organize and secure what was already conquered. He reformed the administration of the provincial governments by doing away with the rule of proconsuls with absolute power and substituting officials responsible to him, whose promotion in office depended upon their ability and faithfulness. The army, scattered along the vast frontier, now owed allegiance to him as the head of the state, instead of to the various commanders. The finances were placed on a firm financial basis, and the custom of selling the taxes to the highest bidder was greatly restricted. In the midst of all these reforms Augustus found time so to beautify the city that he could boast that "he found Rome brick and left it marble."

Augustus was one of those rare men who improve with age and prosperity. He raised himself to power by crimes and deceptions, but once master of Rome, he proved himself a great statesman, able to conceive and carry out a plan of reconstruction which preserved the empire and gave it peace, diffused order and a

sense of security and preserved civilization for over two centuries. The Augustan Age also marks the highest attainment of the Romans in literature. The chief writers were Vergil, Livy, Horace and Ovid.

Augustus, the name of two electors of Saxony who were also kings of Poland. Augustus I, Frederick (1670-1733), succeeded his brother in the electorate in 1694, and upon the death of John Sobieski, two years later, became King of Poland as Augustus II. He formed an alliance with Russia and Denmark against Charles XII of Sweden, but was overcome and deposed. After the defeat of Charles at Pultowa, he recovered the Polish crown and peace with Sweden was restored.

Augustus II, Frederick (1696-1763), succeeded his father Augustus I as Elector of Saxony in 1733, and was elected King of Poland as Augustus III the same year through the influence of Austria and Russia. His part in the Seven Years' War turned out disastrously, and he was forced to leave the country.

Auk, the name given to a family of sea birds with thick, heavy bodies; short wings, tails and legs; three webs between their toes; and a high, compressed bill. They live only in the colder parts of the Northern Hemisphere. Typically sea birds, they visit the land only to breed, laying the large, single egg on a narrow, almost inaccessible shelf or ledge of rock. On account of the small size of the wings these birds cannot fly for any distance, but they are among the most expert of swimmers on top of, as well as under, the water.

GREAT AUK, or GAREFOWL. The great auk, which has been practically extinct for the past 70 years, is the most famous, as well as the largest, species of auk. This bird was about the size of a wild goose; the upper parts were black; the under parts white; and there was a white spot in front of the eye. The wings were very small, rendering the bird flightless. It inhabited the rocky shores of Iceland, Newfoundland and adjacent lands, from which it migrated in winter as far south as Virginia. In early years it was used as food and, later, was hunted for its plumage. So persistently was it sought that by the middle of the last century it had disappeared. The skins, skeletons and eggs are now eagerly sought by the larger museums.

Auks of smaller size are now numerous in North America, the razor-billed auk being common in the North Atlantic Ocean.

Aure'lian (about 212-275), a Roman emperor, whose Latin name was Lucius Domitius Aurelianus. He succeeded Claudius in 270, as emperor, and at once began active measures against the barbarian invaders. He strengthened the frontier of the empire by making the Danube the boundary, put down internal rebellion and restored general prosperity and political unity to the Roman dominions. The famous Wall of Aurelian was begun by him in 271.

Aure'lius, Marcus (121-180), surnamed Antonius, a Roman emperor and philosopher, the adopted son and successor of Antoninus Pius. He became emperor in 161, but was forced to spend the greater part of his reign in camp, fighting against the barbarians, who were already beginning to press hard against the frontier. He succeeded in keeping them out, but died in the midst of his wars. Aurelius considered that some of the Christian doctrines tended to overthrow the Roman state, and he persecuted the Christians. Though he wrote much on scientific subjects, his *Meditations* is his only work extant. This work has been translated into many languages and is still read.

Aurochs, *O' roks,* a nearly extinct member of the Bovine Family which was formerly common throughout Europe but is now found only in the southern and western part. It somewhat resembles the American bison, to which it is probably related. The head is broad, having thick horns which were once greatly valued as drinking horns. The forehead, shoulders and breast are covered with long, wavy hair intermingled with soft

fur. The long hair is shed in summer and renewed in the late autumn. The tufted tail is of moderate length. Aurochs travel in herds; they have never been domesticated, but have been protected to a certain extent by Russian imperial edict.

Auro'ra, the mythical goddess of the dawn, was the daughter of Hyperion and Thia, and sister to Sol and Luna. She is usually considered as robed in filmy, saffron-colored draperies, rising from the ocean at daybreak, putting out the stars, opening, with rosy fingers, the portals of the new day, and then dashing across the sky in her glittering car. Sometimes she scatters flowers; sometimes she throws back her long veil. Her tears are the dewdrops.

Aurora Borealis, *Au ro' ra Bo" re a' lis,* an illumination of the sky, occurring in middle and polar latitudes, most frequently in a zone lying between the 60th and 70th parallels. In the Southern Hemisphere the phenomenon is known as the *Aurora Australis.* It is believed to be due to electrical discharge taking place at an elevation of from 50 to 100 m. above the surface in water, vapor or other rare gas. The aurora usually appears as an arch or band of yellowish light, though it not infrequently takes the form of a group of beams, a ribbon, corona, haze or diffused light. In middle latitudes of the Northern Hemisphere it is seen in the north; in extreme high latitudes it appears in the south, its arch spanning the sky always in a direction from east to west.

Aurora, Ill., a city of Kane Co., 37 m. w. of Chicago, on the Fox River and on the Chicago, Burlington & Quincy, the Chicago & North Western, the Elgin, Joliet & Eastern and other railroads. The Aurora, Chicago & Elgin electric line connects the city with Chicago and Elgin, and other interurbans connect with Joliet, Plainfield, Batavia, Geneva, St. Charles, Yorkville, DeKalb and other cities, making the city one of the greatest interurban centers in the state. It is also an important commercial and industrial center. The river divides the city into two parts. The manufacturing and business centers are on or near the river, and the residential sections are on the higher ground upon either side. The city has an attractive site, the streets are broad and well shaded and the beautiful homes are surrounded by lawns and flower gardens.

Public Buildings. The noteworthy buildings include a soldiers' memorial hall, a number of banks, city hall, post office, hotels and substantial business blocks. There are about 35 churches.

Institutions. The educational institutions include the East and West Aurora high schools, public and parish schools, a free library, a business college, Jennings Seminary for young women, Aurora College and several private schools. There are a number of benevolent and charitable institutions.

Industries. Among the principal industrial and manufacturing establishments are railroad-car shops employing about 2500 men, cotton mills, carriage and wagon factories, foundries and machine shops, smelting and refining works, woolen mills, sash and blind shops, wheel-scraper works with 1500 employees, flour mills, stove works and manufactories of hardware specialties, silver plate, corsets, suspenders, binders' board, brass goods and motor cycles.

History. The first settlement in the vicinity of Aurora was made in 1834. The village of East Aurora was incorporated in 1845 and West Aurora in 1854. The two villages were united under a city charter in 1853 and a revised charter was granted in 1887. Population in 1920, U. S. Census, 36,397.

Aus'ten, Jane (1775-1817), English novelist, was born in the village of Steventon, Hampshire. She was the daughter of a clergyman and the granddaughter, on her mother's side, of Theophilus Leigh, for half a century master of Balliol, Oxford. Her life was quite uneventful; when she was 26 her family moved to Bath, and, after the death of her father in 1805, to Southhampton. In 1809 there was a final removal to Chawton, and here Miss Austen remained un-

til the year of her death. She was never married. Her literary work was done in the midst of a perfectly ordinary round of duties. She read, sewed, kept house, went to church and lived the life of a typical middle-class woman in a small village.

In view of this, her literary achievements seem remarkable. She had no knowledge of the stirring events in the world outside her little town, but she wrote in a fascinating way of the commonplace life of the provincial family. A picnic, a dinner party, an uneventful love affair and a visit to the dressmaker were, in her estimation, all worthy of treatment, and she did not feel it necessary to use the material other novelists draw upon—crime, passion, politics and war.

The result was a list of books which have put her among the classic English novelists. She combines a pure ironical humor with a clear and flowing style, an admirable story-telling manner and complete fidelity to fact. Her novels are exact in structure and symmetrical in form. Moreover, her characters are depicted with a reality that shows brilliant handling. In her mastery of irony she is often compared to Meredith, but she lacks his powers of imagination and feeling for nature. Miss Austen was enthusiastically admired by Coleridge, Tennyson, Macaulay, Scott, Disraeli and others of note.

The following is the complete list of her novels: *Pride and Prejudice, Northanger Abbey, Mansfield Park, Emma, Persuasion* and *Sense and Sensibility.*

Aus'terlitz, Battle of, the celebrated battle where Napoleon, Dec. 2, 1805, defeated the Austrians and Russians. The French army numbered 70,000 against 84,000 of the allies. The French loss was only 7800, while the allies lost 35,000. Austria was forced to sign the Treaty of Pressburg, Dec. 26, 1805. This is ranked as Napoleon's most brilliant victory. It is often called the "Battle of the Three Emperors," as the Austrian and Russian rulers were also on the battlefield.

Aus'tin, Alfred (1835-1913), an English author, born at Headingley, near Leeds. In 1853 he graduated at the University of London and later was admitted to the bar, but abandoned law for literature after a short practice. In 1896 he became poet laureate. Austin produced several volumes of verse and some critical writing. His principal works are *Songs of England, Savonarola, A Tale of True Love and Other Poems, England's Darling, In Veronica's Garden, English Lyrics, A Lesson in Harmony* and *Haunts of Ancient Peace.*

Austin, Minn., a city and the county seat of Mower Co., 100 m. s. of St. Paul, on the Red Cedar River and on the Chicago, Milwaukee & St. Paul, the Chicago Great Western and other railroads. The town is in the midst of a fertile prairie, the principal products of which are flax, barley, wheat, grass seeds, live stock and butter. Good water power is supplied by the river. Among other industrial plants are meat-packing establishments, foundries, machine shops, grain elevators, flour mills, hydraulic-cement works, a creamery and cheese factory, brick and tile works, a novelty-goods factory, a flax-fiber mill, a sewer-pipe manufactory and a canning and preserving factory. Austin is the seat of the Southern Minnesota Normal College and the Austin School of Commerce; and it has, among other fine buildings, a Carnegie library, courthouse, city hall, the Central High School and St. Augustine's Church (Roman Catholic). Settled in 1854, Austin was incorporated as a village in 1868 and five years later chartered as a city. Population in 1920, U. S. Census, 10,118.

Austin, Stephen Fuller (1793-1836), a Texas pioneer, born in Virginia. In 1821 he led a colony to Texas, founding a settlement on the present site of Austin. In 1833 he took part in the movement to form a constitution for Texas, and in 1835 was appointed a commissioner to the United States Government to secure its recognition of Texas as an independent state, acting, in this capacity, with prudence and moderation. He

died shortly after returning to Texas. Austin was instrumental in preparing for Texan independence and is regarded as one of the leading founders of the state's prosperity.

Aus'tin, Tex., county seat of Travis Co., and capital of the state, on the north bank of the Colorado River, 165 m. n.w. of Houston and 215 m. n.w. of Galveston, on the Missouri, Kansas & Texas, the Houston & Texas Central, the International & Great Northern and other railroads. Austin is the principal trade and jobbing center for western and central Texas. The city is attractively situated on high bluffs 40 to 120 ft. above the river, which is here spanned by several bridges. A new bridge has recently been completed at a cost of $210,000. The railroad facilities are excellent and afford the city access to and from all parts of the state. There is a modern street-car system which extends to South Austin, opening up another section of the city, and to the great Austin Dam.

Parks and Boulevards. Austin is well laid out with paved and shaded streets. There are a number of handsome parks, including Woolridge, which is perhaps the most beautiful amphitheater in the South. Congress Avenue, which is one of the handsomest and best-lighted streets in Texas, and East Sixth Street are among the principal business streets, and West Avenue is one of the handsomest residential portions of the city.

Public Buildings. The Texas State Capitol is located on an eminence of about 20 acres near the city's center. The building is of Texas red granite and is shaped like a Greek cross. This building was erected by Chicago capitalists in 1882-88, for a consideration of 3,000,000 acres of Texas public land. This Texas Capitol is the largest public building in the United States, except the National Capitol at Washington, and is said to be the seventh largest building in the world. There are about 18 acres of floor space, and from east to west the building is 600 ft. long; from north to south, 287 ft. deep, and the height of the dome is 313 ft. Other public buildings include a courthouse, post office, city hall, the Littlefield and Scarbrough buildings, governor's mansion, State Land Office, a number of banks, substantial business blocks and a University Y. M. C. A. Building costing $75,000. There are about 35 churches for white people and 16 churches for negroes.

Institutions. The city is the seat of the University of Texas (coeducational), an institution of high rank and the largest university in the South. All the departments of the university are in Austin, with the exception of the medical department, which is located in Galveston. Among the other institutions of learning are: the Presbyterian College, which is under the joint maintenance and control of the synods of Texas, Arkansas and Oklahoma; Swedish College; Austin Academy; St. Mary's Academy (Catholic); Samuel Huston and Tillotson colleges (colored); a manual-training school; a magnificent high school, to which a $90,000 addition is nearing completion; 12 other first-class graded schools in connection with the high school; the Whitis School; and several business colleges. St. Edward's College (Catholic) is located south of the city. The benevolent and charitable institutions include a state school for the blind, state deaf and dumb institute, state insane asylum, Texas State Confederate Home and Confederate Woman's Home.

Industries. Austin is an important market for live stock, grain, cotton, wool and sugar cane; dairying is a growing industry. There are cotton-compress works, flour mills, foundries, cottonseed-oil and lumber and planing mills and manufactories of leather goods and woodenware.

History. Austin was first settled in 1838. In 1839 the town was selected as the site of the Republic of Texas and named Austin in honor of Stephen F. Austin, the father of Texas. The city remained the state capital after Texas entered the Union. In 1890-93 one of the largest dams in the world was built above the city. This dam gave way in

1900, which resulted in great loss of property. A new dam has been constructed, and the lake formed by the dam is about 27 m. long. Population in 1920, U. S. Census, 34,876.

Austra'lia, the smallest of the continents, is situated in the Eastern Hemisphere between the Pacific Ocean on the east and the Indian Ocean on the west, and between 10° 39′ and 39° 11′ 15″ south latitude and 113° 5′ and 153° 16′ east longitude. The Southern Ocean bounds it on the south and the Pacific Ocean on the north. Australia lies east of the central portion of South America and west of the southern part of Africa, its southwestern corner being approximately in the same latitude as the Cape of Good Hope. The continent is directly south of Japan and the Philippine Islands.

Size. The greatest extent of the continent from north to south is 1970 m. and from east to west 2400 m. The area is 2,946,691 sq. m., or about seven-ninths the area of Canada, making Australia the second largest possession of the British Empire. It is more than five times the size of the Union of South Africa and nearly one and one-half times the size of India. The form is that of an irregular oval, with a broad indentation on the south and a deep indentation on the north. The coast line has an extent of 8850 m., and is the shortest in proportion to the area of that of any continent.

Coast Waters. The coast has a few deep indentations. On the north is the great Gulf of Carpentaria, extending 480 m. inland and having an area of over 16,000 sq. m. West of this gulf, in their order, are Van Diemen's Gulf, Anson Bay, Queen's Channel, Admiralty Gulf, Brunswick Bay, Collier Bay, Buccaneer Archipelago and Exmouth Gulf, which marks the western limit of the north coast. On the west there are only a few small indentations, the most important being Geographe Channel, Shark's Bay, Hamelin Pool and Geographe Bay. On the south, the name Great Australian Bight is given to the archlike curve occupying the central part of the coast. Extending inland from the eastern part of the Bight are Spencer Gulf and St. Vincent Gulf, separated by York Peninsula. South of St. Vincent Gulf is Encounter Bay, and in the southeast is Port Phillip, at the head of which the city of Melbourne is situated. On the east coast are Botany Bay, Moreton Bay, on which Brisbane is situated, Hervey Bay, Keppel Bay, Halifax Bay, Princess Charlotte Bay and Shelburne Bay. Torres Strait separates the continent from New Guinea, and Bass Strait lies between Tasmania and the mainland.

Islands. Although Australia lies directly south of and in close proximity to the groups of large islands forming the East Indian Archipelago, it is both geographically and geologically separate from them. The islands belonging to the continent are few and, with the exception of Tasmania, small. Those worthy of mention are Wellesley Island, near the head of the Gulf of Carpentaria, Bathurst and Melville islands, northeast of Van Diemen's Gulf, Kangaroo Islands, south of York Peninsula, and Flinders Island, north of Tasmania. Tasmania is the largest and most important island, and forms one of the states of the Commonwealth.

Extending for over 1200 m. along the northeast coast and lying from 10 to 100 m. from the shore is the Great Barrier Reef, a coral formation constituting a natural breakwater and giving ships a safe channel, extending almost from Sydney to Torres Strait.

Physical Features. Australia has a typical continental structure comprising a primary highland system, a secondary highland system and a great central plain. The continent, as a whole, is a low plateau with a central depression.

Highlands. A series of mountain ranges extend along the entire eastern coast, culminating in Victoria, where in Mt. Kosciusco, 7328 ft., and Mt. Townsend, 7260 ft., are found the highest elevations in the continent. Other peaks in this range over 6000 ft. in altitude are Mt. Bugong, Mt. Feathertop, Mt. Holts-

man and Mt. Cobberas. Several names are applied to different sections of these ranges. North of Victoria they are called the Muniong, and north of Muniong they are known as the Monaro. The most northerly ranges are low, with now and then a peak rising to 4000 or 5000 ft. Above the tree line all the peaks are destitute of vegetation.

With few exceptions the elevations on the western part of the continent are scarcely worthy the name of mountains. The Darling Range follows the coast from Pt. D'Entrecasteaux to the Murchison River, and north of this stream there are a number of detached ranges farther inland that separate the coast region from the central plateau. In these ranges are a few peaks of 4000 ft. altitude. In general, these western mountains are clothed with vegetation to their summits.

Lowlands. Extending across the continent from the Gulf of Carpentaria to the Murray River is a great alluvial plain over 500,000 sq. m. in extent. This plain constitutes one of the most distinguishing features of the interior of the continent. The vast region west of 135° east longitude and north of Musgrave Range, and generally known as the Australian steppes, has a desertlike appearance. It contains many flat-topped hills and extensive rock-covered plains. South of this region, around Lake Eyre, are some sections which are below sea level, but the higher plateaus reach altitudes varying from 1500 to 3000 ft. This steppe region extends westward to the western highlands and has an area of about 400,000 sq. m. The entire region is arid and desertlike. For a more detailed description, see the subhead *Surface* in the articles on each of the Australian states.

Rivers and Lakes. The Murray and Darling rivers, constituting the Murray system and having a navigable mileage of over 1700 m. during high water, are the largest streams in the continent. They drain most of the southeastern portion, and during the dry season are fed by melting snows on the mountains, so that they have a constant flow. The Flinders and Leichhardt are the chief streams flowing into the Gulf of Carpentaria. The Daly flows into Anson Bay, and flowing north into the Indian Ocean are the Fitzroy, the Fortescue, the Ashburton, the Lyons, the Gascoyne and the Murchison. The rivers of the great interior plateau find no outlet to the sea, but discharge into lakes or lose themselves in the sand. Many of these streams are dry except during the rainy season.

The chief lake region of Australia consists of a series of depressions in the south-central part of the continent, the largest portion lying in the State of South Australia. The largest lakes in this region are Lake Eyre, Lake Torrens, Lake Gairdner, Island Lake and Lake Frome. In the southwestern part of the Northern Territory is Lake Amadeus, and in the southern part of Western Australia is another region containing a number of lakes, but they are smaller than those in the first region. Since these lakes have no outlet to the sea, their waters are salt or brackish. During the dry season the smaller ones become marshes or mere pools.

Borings in numerous localities in the great alluvial plain reveal a large supply of underground water, which is easily brought to the surface, and is being used more and more each year for irrigation.

Geology and Minerals. Geologically considered, Australia is the oldest of the continents, and large portions of it were dry land long before the surface of Europe appeared above the sea. The continent is a part of a still more ancient plateau, consisting of archæan rock, which occupies nearly all of the western half. This is the oldest rock known (See Geology). This rock also outcrops in New South Wales, Victoria, New Zealand and Tasmania, leading to the supposition that these islands and Australia were formerly one land mass.

At some time the sea must have extended across the continent from the Gulf of Carpentaria to the Spencer Gulf, occupying what now constitutes the great alluvial plain and separating the continent into two large islands.

The study of the physical features of the eastern half of the continent shows many geological changes, during which coal and other minerals were deposited, and, later, that glaciers covered a part if not all of the land. There are no active volcanoes, but numerous extinct craters and lava beds tell us that at a comparatively recent date volcanic activity was widely extended and intense.

MINERALS. Gold is widely distributed, and Australia is one of the largest gold-producing regions in the world. From the discovery of gold in 1851, the mines of Australia had yielded over $3,000,000,000, and the prosperity of the states of the Commonwealth is attributed very largely to their gold mines. Gold is found in all the states, but the mines of Victoria have been the largest producers. Until quite recently it was not supposed that Western Australia contained any gold, but in 1882 gold was found in the Kimberley district, and now this state has become the leader in gold mining.

Silver, either alone or in combination with other minerals, occurs in all the states, but the most valuable mines are in New South Wales. Copper is also found in all states and is mined in New South Wales, Queensland, South Australia and Tasmania. There are large deposits of tin in Queensland and the Northern Territory, but the most important mines are in Queensland. Iron is widely distributed, but is not yet extensively mined. Antimony, platinum, lead, asbestos, diamonds and other precious stones are found in varying quantities.

Australia is well supplied with coal, all varieties from lignite to anthracite being found. Brown lignite occurs in Victoria, but it is not of great value. A black coal of much better quality is found in New South Wales in large quantities. The coal fields of Queensland exceed 24,000 sq. m. in extent, and coal mining is an important industry in that state. Petroleum is found in New South Wales in connection with a variety of cannel coal, from which kerosene is obtained by distillation.

CLIMATE. The northern part of Australia, including a little over one-third of the area, is in the torrid zone, and the southern two-thirds, in the south temperate zone. The climate is remarkably even, because of the absence of high mountains and because of the extensive dry area of nearly 1,000,000 sq. m. in the interior. The summers are hot and dry, especially in the south, but the temperature is particularly exhilarating, and the climate is everywhere healthful. The eastern part of the continent is well watered, as are the northern and western portions, but the southern part along the Bight and the vast interior are arid, having an average rainfall of from five to ten inches.

PLANT LIFE. A number of the native plants bear a close resemblance to a past geological age, and all species show marked adaptation to the dryness of the climate. In general, the leaves are small, In many species they are thick and their surfaces so constructed as to prevent evaporation. Many plants contain essential oils, which aid in conserving moisture, while in others the leafstalk is twisted so as to present the edge of the leaf to the sun.

The eucalyptus, or gum tree, is the most widely distributed of any trees. In the most favorable localities trees of the largest species exceed 400 ft. in height. They are valuable for lumber, for their oils, resin and bark, all of which are important commercial products (See EUCALYPTUS). Next to the eucalyptus in importance are the acacias, of which 250 species are found on the continent (See ACACIA). There are also a number of palms peculiar to the continent, but confined mostly to the northern part. The bottle tree, which takes its name from the remarkable shape of the trunk, and the fern and grass trees are found only in Australia.

The mallee scrub, which is a dwarf eucalyptus, and the mulga scrub, a thorny acacia, are common in the arid regions. Here also is found the spinifex, or porcupine grass, so called because of its many spines. Wherever this grass is abundant it prevents the passage of man or animals. It does not serve for fodder,

and, so far as known, is entirely worthless. The salt bush covers extensive areas in the arid region and is valuable fodder for sheep and other animals. It possesses remarkable drought-resisting powers and makes valuable pastures of large areas that would otherwise be worthless.

In Western Australia there are many beautiful flowering plants. There are also many orchids, sedges, sandalwoods and members of the Mint Family widely distributed through the continent. Many lilies are found, but the grand lily, with flowering stalks 30 ft. high, eclipses all the others. The waratah tree, whose crown of crimson flowers can be seen at distances of a half mile or more, is also remarkable. Along the eastern coast the vegetation contains many types that have been transported from the islands in the Indian Archipelago. These types have grown so profusely that they have crowded out the native species, making the plant life of this region somewhat different from that in other parts of the continent.

Animal Life. The native animals of Australia are as peculiar as the plants. Among those specially worthy of mention are: the kangaroo, of which there are a number of species, ranging in size from animals six feet tall to those no larger than a rat (See Kangaroo); the duckbill platypus, which is a connecting link between Birds, Reptiles and Mammals (See Duckbill); the dingo, or wild dog; the Tasmanian wolf and Tasmanian devil, carnivorous animals provided with pouches for carrying their young, and confined to the island for which they are named.

Among other animals are numerous species of venomous and harmless snakes, two species of crocodile and numerous turtles. The emu and the cassowary are the largest birds. The Australian crane, the black swan, the bower bird and the brush turkey are other birds peculiar to this continent. In addition to these, there are many birds of bright plumage and of varying size, making in all about 750 species. There are also many insects common to tropical and semitropical climes.

The surrounding waters abound in fish. The taking of whales, which was formerly an important industry, is still continued to some extent. Sharks are numerous, and seals are occasionally found on remote parts of the coast. Food fish in great variety are found all along the coast.

Inhabitants. The natives are characterized by dark brown, almost black skin, straight or wavy hair and full beard, and well-formed limbs, though the muscular development is less than in most races. When discovered by early explorers, the Australians were in a state of savagery. They made no pretense at tilling the soil, were without clothing and dwelt in huts of the rudest construction. Their number was never known, but the best authorities estimate it to have been about three times the present number, which is about 30,000. Like all savage races, the Australians have suffered from the inroads of civilization, since they do not take kindly to civilized life. Most of those now living are protected by the states in which they reside, being placed on reservations, upon which white men are forbidden to hunt or otherwise to destroy what forms a source of livelihood to the natives. Once a year, or oftener if necessary, the government distributes supplies to these reservations.

Political Divisions. The Continent of Australia is divided into the following political divisions: Queensland, New South Wales, Victoria, South Australia, Northern Territory and Western Australia. The Commonwealth also includes the Island of Tasmania. Each state is more fully treated under its title.

Early History. We do not know by what Europeans Australia was first seen, but traditions of a land referred to as *Terra Australis* reached Europe long before the continent was known to Europeans. The Spaniard De Torres discovered the strait that bears his name in 1606, and Tasman, sent from Batavia in the Dutch East Indies in 1642, discovered the Island of Tasmania and explored the

east coast of the continent for some distance. About this time the Dutch also explored the western coast. The first English explorer to visit the continent was Dampier, in 1688, but it was more than a century before the English made use of this discovery. In 1769-1770 Capt. James Cook, a celebrated English navigator, explored the southeastern coast and discovered Botany Bay, which he so named because of the great number of plants found in that region. In 1788 the first English colony was founded there. Gradually the interior was explored, the number of settlers increased, and other colonies were established, which in time grew into states. See AUSTRALIA, COMMONWEALTH OF.

Australia, Commonwealth of. ORGANIZATION. On Jan. 1, 1901, the states of Australia and the Island of Tasmania united in a federation, designated as the Commonwealth of Australia. Although a union of the Australian colonies was considered essential by some of them as early as 1850, no direct steps towards forming such a union were taken previous to 1885. In that year the British Parliament authorized a Federal Council, to which each of the colonies in Australasia could send delegates. This Council met biennially, and considered matters affecting the welfare of all the colonies, but it had no power beyond that of recommendation, and consequently was of little value.

As the population and commerce of the colonies increased, the necessity for a central government became yearly more imperative. In 1889 a conference of representatives from each of the seven colonies was held in Melbourne. This conference adopted an address to the Queen, expressing the loyalty of the colonies and urging the necessity of an early union under the Imperial Government of the British Colonies of Australasia. This movement led to a convention, which met in Sydney in March, 1891. The convention was composed of delegates from the various colonies, and it adopted a series of resolutions necessary to the establishing of a federal government. These were followed by the draft of the constitution, which, after being carefully considered, was adopted by the convention, The work of this convention, however, received but little attention, because the people had not given the subject sufficient thought to become generally interested in a movement that would lead to such far-reaching results.

At a meeting of the premiers in 1895, at which all the colonies except New Zealand were represented, the movement toward a federal union was revived, and an enabling act, providing for the election of delegates and a convention for forming a constitution, was passed, and in pursuance with that act the convention assembled at Adelaide, March 22, 1897. Later it met in Sydney, and finally completed its work in Melbourne, March 16, 1898. The constitution drafted by this convention was submitted to the people of the different colonies. In New South Wales and Queensland it failed of ratification because of certain objectionable clauses. These objections were removed at a later convention, and when the constitution was again submitted to the people in 1899 it was ratified by all the colonies on the continent and by Tasmania. The following year it was approved by the British Parliament and went into effect, Jan. 1, 1901. The first Parliament was opened by the Prince of Wales on the 9th of May following. Lord Hopetoun, afterwards Lord Linlithgow, was the first governor-general, and Sir Edmund Barton was the first prime minister.

CONSTITUTION. The Australian constitution is considered by students of politics to be one of the best ever ratified. Fundamentally, it is modeled after the Constitution of the United States. The executive department consists of the governor-general, appointed by the Crown and assisted by a council appointed by himself. He is a commander of the army and navy and appoints public ministers and judges of the Federal Courts.

The legislative department consists of

a Senate and a House of Representatives. The Senate is composed of an equal number of senators, not less than six, from each state, chosen by popular vote for six years with a provision that one-half the number retire every three years. The House of Representatives consists of members apportioned from the different states according to population, with the provision that no state shall have less than five. Representatives are chosen for three years. Each house choses its own officers and makes its own rules.

The judicial department consists of a Federal High Court and inferior courts, the judges of all being appointed for life or during good behavior. There is a special provision for appeal from the High Court to the Privy Council of Great Britain. State courts are also given Federal jurisdiction in certain cases. The powers not specifically delegated to the Federal Government are reserved to the states. In this respect the constitution of Australia differs from that of Canada, the latter reserving all powers to the Federal Government, excepting those which are specifically delegated to the states. Among subjects under the jurisdiction of Parliament are commerce, shipping and railways, taxation, tariff, borrowing money on credit of the Commonwealth, postal and telegraph service, defense, currency, banking and bankruptcy, weights and measures, copyrights, patents and trade-marks, marriage and divorce, immigration and emigration, conciliation and arbitration in industrial disputes. No state can enact laws which are not in accordance with the Federal constitution and the laws enacted by Parliament. In accordance with a provision of the constitution in 1908, the national capital was located in the Federal District Yass-Canberra in New South Wales, and in 1911 the construction of the new city was begun.

Education. Public education is under the control of the respective states. Attendance upon the common schools is compulsory. There are a number of technical and superior schools and four universities, located respectively at Sydney, Melbourne, Adelaide and Hobart.

Communication. An excellent postal system is maintained throughout the Commonwealth. In 1912 there were 16,500 m. of railway, 15,500 m. of which were owned by the government. Railway lines are being rapidly extended in all the states.

Defense. Australia maintains an army and navy. The military force comprises 80,000 men; one-half of these constitute the regular army and the other half the reserves. In the war of 1914, Australia as one of the self governing members of the British Empire, promptly raised an expeditionary force for service in Europe, which accomplished a great work in Gallipoli and in France. It was an Australian cruiser that sank the Emden, and her navy completed the conquest of several German colonies in the Pacific.

Agriculture, etc. The industrial development is described under the respective states. See Queensland; New South Wales; South Australia; Tasmania; Victoria; Western Australia. Population in 1919, 4,896,000.

Australian Ballot, a system of voting first used by the several colonies of Australia. It was invented to secure secrecy to the voter, prevent bribery at elections and effectively check fraud in voting. The ticket used in voting under this system is provided by state or local election authorities and contains the names of all nominees for office of all political parties. The seal of the package containing the ballots to be used is broken in the presence of the judges of election on election morning. Each voter as he enters the voting booth, or separate compartment, is given a ballot previously marked with the initials of an inspector, as a means of establishing the validity of the sheet, and he may mark it as he pleases, thus secretly expressing his choice of the persons to be elected. The voter indicates his choice by placing crosses opposite the names of the persons preferred; or he may place a single cross opposite the name of his party in the designated sym-

bol if he desires to vote a "straight" ticket.

The system was adopted in New South Wales in 1858 and speedily came into use in the other Australian colonies, where it proved highly successful. The present law in Great Britain, based on this system, was passed in 1872, and was first used in Massachusetts in 1887 as an experiment in ballot reform in the United States. So admirable were its provisions that within four years 28 states had adopted the system, with only slight modifications. It is now in general use throughout the United States.

Aus'tria. A nation situated near the geographical center of Europe, extending from Bavaria on the west to Hungary on the east, from Czecho-Slovakia on the north to Jugo-Slavia on the south. Its total area—according to the boundaries established by the Treaty of Paris—is about 31,000 sq. m. Its population in 1919 was variously estimated between 6,000,000 and 7,000,000. It will be noticed that in area it corresponds closely to the state of South Carolina, it is, however, far more densely settled.

ETHNOLOGY. Present day Austria includes only those sections of the old empire of Austria-Hungary in which the population is chiefly Germanic in ethnology, namely, the provinces of Upper and Lower Austria, Salzburg and Voralberg; and the northern portions of Tyrol, Carinthia, and Styria. The southern part of Tyrol, being Italian in ethnology, is now a part of Italy; while the southern part of Carinthia and Styria, being Slavic in ethnology, form a part of Jugo-Slavia. The term, Austrian, then, does not denote a people ethnically or linguistically different from the people of Germany. It will be noticed that Austria extends like a Germanic promontory into a Slavic sea separating the Jugo (south) Slavs from their northern brethren terminating in a territory inhabited by a non-Aryan people (Hungary). These facts explain much that is strange in the history of the recent Austro-Hungarian empire.

SURFACE FEATURES. The Alps control the surface features of all the southern

provinces of Austria. From Switzerland prominent mountain ranges enter Tyrol and send their spurs into the southern provinces generally, rendering Austria one of the most mountainous sections of Europe. The mountains of western Austria are almost as high, complex, and wild as those of Switzerland. At places —especially in Tyrol and Carinthia— their flanks are covered with living glaciers, and the ranges are interrupted by deep gorges, down which course dashing torrents. At several places peaks lift themselves 10,000 feet in the air; the highest one, Ortler Spitze, being on the western boundary,—12,802 feet in altitude. The most pleasing features of Alpine Austria—by far the larger portion of the republic—is the large number of lakes of great scenic attraction, some located at high altitudes, picturesquely nestled among the lofty, steep, and forest-clad mountains. North of the Danube River, the surface rapidly assumes the characteristic features of western Czecho-Slovakia.

MINES AND FORESTS. Styria, Carinthia, and Tyrol are famous for their mines, of which about one-half are coal, one-fifth are iron, one-fourteenth gold and silver. Carinthia is celebrated for its lead, besides which arsenic, sulphur, cobalt, and copper are mined. Salt mines are numerous. The Salz Kammergut in Upper Austria is famous for its salt mines. The iron mines of Styria were worked in Roman times. The stone quarries are numerous and yield valuable products. Various kinds of gems are found in Carinthia. Coal, mostly lignite, is mined in all the provinces. The forests of Austria are of great importance. Forestry is a science and whatever land is unfit for pasture or tillage is devoted to forests, carefully managed by state foresters. Immence quantities of timber are floated down the rivers—especially the Drave—to manufacturing centers.

AGRICULTURE. Although the larger portion of Austria is mountainous, but a small portion is unproductive, it is employed either as meadows, tilled fields, or pasturage. Where unfit for these pur-

poses, it is devoted to forests. Upper and Lower Austria are the most productive of the provinces. All the usual grains of the temperate zone are raised. Wheat, barley, rye, and maize are the principal cereal crops. The live stock industry is very great throughout the republic. Horses, cattle, sheep, swine and goats are the principal farm animals. Potatoes are raised everywhere and in some districts they are often the sole subsistence of the inhabitants. Great quantities of cider are made in Upper Austria and Carinthia.

MANUFACTURES. The textile industry is the most important. In many parts of Austria it is the house, or home production, rather than the real factory system that prevails but modern manufacturing concerns are to be found. For the textile industry, cotton is imported, coming largely from the United States. The production of raw silk as well as the finished product is important in Tyrol.

Iron and steel manufacturies of great importance, especially in Styria; and the iron mills are fully abreast of the times. The production of pig, cast, and wrought iron, Bessemer steel, iron bars, etc., is very large. Steel rails, iron plate, steel wire are manufactured, besides the numerous comparatively smaller manufactures of all kinds of metallic ware. The machine building industry is also prominent, this includes the manufacture of locomotives, agricultural machinery, and all kinds of machinery used in modern manufacturing establishments.

GOVERNMENT. The Republic of Austria came into being when the old Austria-Hungary Empire disintegrated at the conclusion of the World War; its bounds were fixed by the Treaty of Peace in accordance with the principles of ethnic determination adopted as a basis of national determination by the framers of the treaty. Vienna remains the capital and the province, independent in local affairs, send their quota of representatives to the national Assembly.

HISTORY. See AUSTRIA-HUNGARY.

Austria-Hungary. The Dual-Empire which at the beginning of 1918 was the largest nation in Europe excepting Russia. It occupied a commanding position extending from Switzerland on the west to Roumania on the east, from Saxony on the north to Serbia on the south. It possessed an area of 241,513 sq. m., with a population of nearly fifty millions. At the close of 1918, as one of the results of the utter collapse of the Teutonic Allies in the World War, Austria-Hungary had ceased to exist. It had disintegrated into the ethnic elements which had previously composed the unstable combination of races that constituted the dual empire, and Austria-Hungary is now of historic interest only.

HISTORY. The history of Austria-Hungary necessarily includes much of the history of Austria, Hungary and Czecho-Slovakia. Austrian history is the principal strand with which the history of the countries just named are inextricably interlaced. This history is of great interest, since it goes back to early times and covers important epochs in general history, during which time Austria played an important role—being the leading state in Europe. In the second century, when Rome reached its greatest extent, the present territory of Austria formed a part of its eastern frontier. But little was known of the vast territory to the north and east save that numerous Germanic and Slavic tribes there met in ceaseless struggle for supremacy.

In the fourth century of our era occurred the wonderful invasion of Europe by the Huns from Asia. They carried with them fire and the sword and civilization perished wherever they passed. This barbaric invasion occasioned a general displacement of Slavic and Germanic tribes. A period of confusion extending over some centuries ensued, constituting the so-called Dark Ages in Europe, when nations and people were incessantly on the move. Celts, Slavs, Teutons, Huns, and Romans mixed and were lost in the wild confusion. The Western Empire of Rome fell, and various Germanic kingdoms were formed out of its ruin. Finally we come to the times of Charlemagne. He established in the latter part

of the eighth century a mark, or frontier land, on the Danube to serve as a dam across the valley to protect his kingdom from invading people from the East. This mark included the present provinces of Upper and Lower Austria. Around this nucleus there arose by dint of struggles and marriages, what we formerly knew as the Austria-Hungarian Empire, fragments of which now form the Republics of Austria, Hungary, Czecho-Slovakia, and a large part of Jugo-Slavia.

During the century that followed, other invasions from the East rolled in on Europe. One was that of the Magyars, a Finno-Ugrian people who came up the Danube in the ninth century. They seized and occupied the territory they have ever since held,—modern Hungary. From this center their wild raids over Europe made them an object of terror for a half century, but they met a severe defeat at Augsburg at the hands of Otto I. It was his son, Otto II, who established the "Oesterreich" (Austria) the eastern mark of Charlemagne's time —and assigned it to Leopold I, the founder of the Babenburg dynasty that ruled in the Duchy of Austria until 1246. The energies of the House of Babenburg were chiefly spent in enlarging the area and strengthening the position of the old mark. As a result of their effort the old Roman province of Styria became a part of the duchy.

The celebrated House of Hapsburg now appears on the scene. The name is derived from the Castle of Hapsburg—a Hawk's Castle—on the Aar, in Switzerland. The castle itself was built in the beginning of the eleventh century, its owners afterwards became overlords of Alsace and Swabia and were created counts. In 1273 Rudolph of Hapsburg was elected Emperor of Germany and in 1282 he conferred Upper and Lower Austria, Styria, and Carinthia (almost our modern Austria) on his two sons, Albrecht and Rudolph as joint heirs. Tyrol was added to this duchy in 1363. It was Rudolph II that first assumed the title of Archduke of Austria. The dominions of the Hapsburgs were extended by judicious marriages quite as much as by victorious wars. Thus in 1438, Albert V —a Hapsburg—emperor of Germany, married Elizabeth, daughter of Sigismund, King of Hungary and Bohemia, and on the death of Sigismund, Bohemia, Hungary, and the archduchy of Austria were united in one, and thus formed nearly the Austria-Hungary of recent times.

HUNGARY. The history of the second member of the Dual-Empire, Hungary, is also of great interest. Hungary is a land of non-Aryan people surrounded by Slavic people on three sides fronting German Austria on the west. The explanation is the wonderfully fertile plains of Hungary. The fierce invasion of Europe by Hunnish forces under their great leader, Attila, left as it receded a Finno-Ugrian population in what is now Hungary, which disappeared beneath the returning waves of Slavic people so that in the ninth century of our era a Moravian empire, of which we know but little, held sway over that country.

Then came the Magyar invasion. Their tribes came up the valley of the Danube under their half mythical leader, Arpad, and occupied in turn the plains of Hungary, easily overthrowing the Slavic kingdom they found in possession. For four centuries the Arpad line ruled in Hungary. Their great King was Stephen I, who introduced Christianity into Hungary, and was canonized for his activity in this matter and so is known in history as Saint Stephen. At his coronation the pope presented him with a crown which until the very last played an important part in the coronation of every Hungarian King. For more than a century the Magyars were the barrier of Christendom against the Ottoman Turks. Their illustrious leader was John Hunyadi who has passed into history as the one who saved Europe from the Turks. Finally as we have seen, Hungary became a possession of the House of Hapsburg.

Almost continuously since the death of Sigismund, Bohemia (now a province

of Czecho-Slovakia), Hungary, and Austria (including Carinola, now a part of Jugo-Slavia) were united politically, though not always in the same way. In 1526 the three independent states, as they then existed,—Austria, Bohemia, and Hungary—united as fully autonomous states. At that time Hungary was in the grip of a Turkish invasion, in fact, about the only independent part of Hungary was what is now known as Slovakia, the highland section of North Hungary, and it required the united efforts of Austria and Bohemia to rescue Hungary from Turkish rule. Though the three states united as autonomous powers yet being under the rule of the House of Hapsburg, Austria at once began systematic efforts to Germanize and centralize all power in Austria. Both Bohemia and Hungary resisted as best they could this tendency.

In 1618, Bohemia attempted a revolution. She was severely defeated by Austria. This was followed by terrible persecutions of the Bohemian people and the nation nearly perished in the Thirty Years War. In the general reaction in Europe following the French Revolution, Bohemia attempted a revolt. This failed. After the later reverses of Austria in 1859 Austria was compelled to come to an understanding with Hungary and Bohemia. Hungary was granted full autonomous rule, but had the same ruler, the emperor of Austria being also the King of Hungary and was crowned as such at Budapest. The same procedure was promised in the case of Bohemia, but this promise was never kept, and Bohemia never acknowledged the rule of the Hapsburgs as legitimate.

We can now understand the peculiar nature of the Austria-Hungarian empire. Not only were the interest of the two principal nations—Austria and Hungary—at variance in some respects, but each one held in unwilling bonds other people, diverse in ethnology with a different history and with different national ideals. The subject people were the Czechs in Bohemia; the Slovaks in Hungary; the Croatians and Slovonians; the Serbs in Bosnia-Herzegovina, now a part of Jugo-Slavia, Roumanians in Transylvania; and the Poles in the Crown lands of Austria, north of the Carpathians. All these subject people were roused to a new sense of nationality. It is generally agreed that only the personal popularity of Francis Joseph I held this polyglot empire together in a semblance of union.

Then came the World War of 1914. The Dual-Empire was not strong enough to withstand the shock of defeat, and the closing weeks of the war witnessed its disintegration into its ethnic constituents. In its stead we have the nations of Austria, Hungary, Czecho-Slovakia; the greatly increased territory of Servia (now Jugo-Slavia); Roumania, which has received Transylvania; and resuscitated Poland, to which has been given that part of the old Empire north of the Carpathian Mountains. (See articles on each of these nations.)

Austrian Succession, War of the, a war lasting from 1740 to 1748, which involved nearly all the powers of Europe. In 1740 occurred the death of Charles VI, last of the direct male line of the Hapsburgs, and disputes arising concerning the succession to dominions of the House of Austria brought on the war. Before his death Charles had bound the leading powers of Europe to an agreement called the Pragmatic Sanction, according to which all his hereditary possessions should go to his daughter Maria Theresa if he left no male heir. The nations, however, failed to observe the agreement, and Frederick of Prussia marched an army into Silesia, taking possession of the country by force of arms. Maria appealed to the Hungarian nobility, who rallied to her support, while England, Protestant Netherlands and, eventually, Russia became her allies. This war embraced two Silesian wars, wars in India, the "Forty-five" in Scotland and King George's War in America. It was settled by the Treaty of Aix-la-Chapelle (1748), by which Prussia retained Silesia and Spain gained several Italian duchies.

Autocrat of the Breakfast Table, the title of a book held by some to be the most popular and interesting work of Oliver Wendell Holmes. In it his wit and humor, his kindly philosophy and delightful style are combined with the ease and charm of conversation which always distinguished him; for the Autocrat is simply the conversation at the breakfast table of a Boston boarding house. Holmes himself, the Autocrat, does most of the talking. The book comprises a collection of sketches which appeared in the *Atlantic Monthly* in 1857 and 1858.

Au"tomo'bile, a self-propelling carriage used on common highways for transporting passengers and freight. The term does not include traction engines, nor self-propelling vehicles that move on rails.

According to the motive power used, automobiles can be divided into three classes: those driven by steam power; those driven by gasoline or other internal-combustion engines; and those driven by electric motors. The steam automobile was the earliest in the field, and until the perfection of the gasoline engine was the most common, but it has been almost entirely replaced by the gas-driven carriage.

Electric vehicles are used in cities and in other sections where there are paved roads. The current is supplied by a storage battery and operates an electric motor which is attached by a gear or a chain and sprocket wheel to the rear wheels. When the battery becomes exhausted, it is recharged by connecting it to a current developed by a dynamo. Electric automobiles are easy to operate, simple in construction and easily cared for. They are desirable for family service in and about cities, and many of them are operated by ladies. They are usually constructed to carry two or four passengers. On good roads the average electric automobile will travel from 75 to 100 m. without requiring a recharge of the battery.

The automobile driven by the gasoline engine, however, is best adapted to long distances, and vehicles of this type far outnumber all others. There are many patterns, each adapting the vehicle to the special use for which it is intended. In size and power, the gasoline automobiles vary from the light runabout, carrying two persons and of about twenty-horsepower, to auto buses carrying over 50 passengers, and to the large auto truck that will carry over five tons of freight and having 50- or 60-horsepower engines. The touring car is the most common passenger type of the gasoline automobile. These cars are usually constructed to carry five or seven passengers and on good roads will average 20 m. an hour with safety, but most of them under favorable conditions can attain a speed of from 50 to 60 m. an hour. Such speed on public highways, however, is not allowable.

From the first the automobile has attracted the attention of the sportsmen, and in the United States and Europe there has always been a wide interest in automobile races. Racing cars, with from 60- to 90-horsepower and costing as high as $25,000, have been constructed, and annual races are maintained at a number of places in this country and in France. At the race at Ormond Beach, Fla., in 1906, a car ran a mile in 31 4/5 seconds, and in other instances a speed of more than 140 m. an hour has been attained.

Uses. Automobiles are in general use in practically all civilized countries. With proper care in driving, a well-constructed car travels rough roads without difficulty. Numerous trips have been made across the United States from the Atlantic to the Pacific, and in 1907 an English car was driven from Peking to Paris, a distance of over 10,000 m., a portion of which was through a desert, and the journey was completed without mishap. The automobile is recognized as one of the most practical and efficient means of transportation for both passengers and freight, and in cities the touring car, the runabout and the auto truck are gradually replacing the horse. Auto trucks are constructed for all sorts of purposes, besides carrying heavy freight. There are

light delivery wagons for the retail merchant, ambulances, fire trucks, or automobile fire engines, hearses, buses and cabs. There are auto liveries of taxicabs, so called because they contain meters that record the number of miles traveled, and the distance determines the fee paid by the passenger. In most sections farmers have purchased automobiles and find them profitable for business as well as a source of pleasure. Light runabouts cost about $650, touring cars from $1000 to almost any price the purchaser wishes to pay, and auto trucks cost about the same as the wagons and horses required to do the same amount of work. The expense of maintenance is claimed to be slightly less than that of the horses.

History. The automobile is the outgrowth of the steam road wagon, which was successfully used in France in 1769. In 1784 a successful steam carriage was constructed in England. Between that date and 1836, several improvements upon the first carriage were made, and a few steam carriages were employed in carrying passengers for several months, but with the perfection of the locomotive and the beginning of railway construction, the steam road carriage was for the time abandoned. The revival of interest in the steam carriage was due to such improvements in the steam engine as enabled machinists to construct small engines having a high power. With the application of this type of engine to driving road wagons, the present era of automobile development began about 1890. The perfection of the gasoline engine was the next great step in advance. The more recent efforts of manufacturers have been directed towards perfecting the apparatus controlling the engine, to improving the steering device and to beautifying the design of the car, and at the same time contributing to the comfort of the passengers. France and the United States are the two leading countries in the manufacture of automobiles. The value of the yearly output in this country is almost 2 billion dollars. See Gas Engine; Locomotive.

Auto Truck. See Automobile.

Au'tumn, the season of the year beginning when the sun enters the sign Libra, at the autumnal equinox, about Sept. 22, and continuing for about 89 days until the sun reaches the winter solstice, about Dec. 22. At the time of the autumnal equinox the rays of the sun fall vertically upon the earth, but less and less so as it passes farther south, so that less heat is generated and the shortening days give less time for warmth, while the lengthening nights give more time for cooling. Frosts come and the leaves and fruit fall. See Spring; Summer; Seasons.

Av'alanche, a sliding mass of snow and ice on a mountain side. Some avalanches are borne down by their own weight; and these are the most dangerous. They increase in mass and in momentum as they descend, and, uprooting trees and demolishing villages, pursue their destructive course to the valleys below. Avalanches are sometimes of enormous size. In 1885 an avalanche in the Italian Alps was estimated to weigh 45,000 tons.

Aver'nus, a lake in the volcanic region of Italy near Vesuvius. Lake Avernus fills the crater of an extinct volcano, and, because of its wild surroundings and the sulphurous fumes that arose from its waters, the ancients believed it was the entrance to the infernal regions. It was dedicated to Proserpine and was supposed to be inhabited by monsters. The lake has now lost the aspect of desolation to which it owed its ancient fame.

Aves'ta. See Zend-Avesta.

A'viary, a house or series of houses or other structures for confining birds, either for the purpose of propagation or for public exhibition. In many cities large collections of living birds are exhibited for the instruction and pleasure of the public. Aviaries are usually connected with zoological gardens, the cities of Chicago, New York, Philadelphia, Washington, Cincinnati and Rochester containing notable collections. In Europe aviaries are maintained in many of the large cities, and many large country

estates contain aviaries of greater or less extent. The aviary is usually divided into separate houses for different kinds of birds, as the parrot house, the song-bird house, the gallinaceous house, the dove house, etc. Different kinds of cages are also used, smaller ones for the diminutive song birds and large flying cages enclosing a pond with fresh, flowing water for those birds which need this room. The birds kept in these aviaries embrace nearly all of the groups of birds, from the ostrich to the higher song birds, the thrushes. The birds are about equally divided, usually, between American and exotic birds, the preference being given to those birds of bright color or unusual form.

A"via'tion. See AERONAUTICS.

Avocado, *Av" o ka' do.* See ALLIGATOR PEAR.

Avocet, *Av' o set,* a bird of the Avocet and Stilt Family. This curious bird, with its long legs and long, slender bill, which curves upward at the end, is a familiar sight on the shores of the lakes and ponds of western North America. It breeds from Saskatchewan, south to Texas, and winters in the West Indies and Guatemala. The colors are conspicuous, the head, neck and shoulders being light cinnamon; the under parts, rump and wing patches, white; and the rest of the wings, black. The avocet feeds on insects, which it catches while either wading in shallow water or swimming a short distance from shore. The nest which is made of grass, is always placed near some body of water, and contains three or four brown-spotted eggs.

Ax'iom, a statement of a fact, usually of scientific nature, the truth of which is so apparent that it requires no proof. Axioms form the basis of philosophical and mathematical reasoning and are always concise in form. They differ from definitions, which are wholly descriptive, and from postulates, which assume facts to be true that may or may not be so; earlier philosophers often interchanged these terms, however, or, at least intermingled axioms, definitions and postulates without distinction of name. The primary axiom of Euclid and the one generally stated as the first axiom of modern geometry is "Things which are equal to the same thing are equal to each other."

Aylesworth, *Alze'worth,* **Sir Allen Bristol** (1854-), a Canadian statesman and lawyer. He was educated at Toronto University and began practicing law. In 1903 he became a member of the Imperial Alaska Boundary Tribunal, two years later he was postmaster-general, he became minister of justice in June, 1906, and he attended The Hague Tribunal in the fisheries conference in 1910. Later he went to Washington, D. C., regarding The Hague Tribunal award, and in February, 1911, he retired from politics.

Ayr, *Air,* a town on the west coast of Scotland, 34 m. s.w. of Glasgow. It is situated upon the River Ayr, which there flows into the Firth of Clyde, forming an excellent harbor that makes the town important in the exportation of iron, coal and manufactured goods. The leading manufactures are boots and shoes, leather, woolen goods, lace curtains and carpets; shipbuilding and fisheries are also carried on. The town is old, but the modern portion is well laid out and has many fine buildings, among which are the county buildings, library, academy, railway station and several churches. Two miles away is the birthplace of Robert Burns, and the town abounds in souvenirs of the poet. Chief among these are Alloway Kirk and the Auld Brig, said to have been built about 1250 and celebrated in Burns' *Twa Brigs.* Population, 29,101.

Aza'lea, a beautiful, erect shrub of the Heath Family. It is common in low marshes and is noticeable because of its branching stems covered thickly with dark green leaves which spread in leaflets like the fingers from the palm of the hand. There are generally four or five in a cluster. The flowers are pinkish-white, red or saffron-yellow in color, and have tiny five-lobed calyxes in which are set the long-tubed corollas with five flat-spread, pointed lobes. The stamens are long and extend beyond the tube. At the

base of the corolla tube are located well-filled honey cups, which attract the bees, moths and butterflies that are to assist in fertilizing them. The ants, which would steal the sweets without giving any return aid, are kept away by means of the sticky hairs which line the corolla. There are many varieties of azalea, variously called swamp pinks, pinxter-bloom, flaming-pinxter, swamp azalea, swamp honeysuckle and tree azalea.

Az'imuth, distance measured in degrees on the horizon east or west from the meridian passing through the North and South poles and the zenith. When a star is just setting at any point on the horizon north of due west the number of degrees in the angle made by lines from the eye of the observer to the star and the North Pole will be the *azimuth* of the star, and the number of degrees of the star north of due west will be its amplitude; and similarly for any other quarter of the horizon. See CELESTIAL SPHERE; ALTITUDE.

Azores, *A zorz',* or **Western Islands,** a group of islands in the Atlantic Ocean, a possession of Portugal. They lie about 800 m. w. of the Continent, and extend over 400 m., occupying in all an area of 1005 sq. m. The eastern group embraces the islands of São Miguel and Santa Maria; the central, Pico, São Jorge, Terceira, Graciosa and Fayal; and the western, Corvo and Flores. Their origin is volcanic and earthquakes are frequent. Pico Alto, 7540 ft. in height, is the loftiest summit. Due to the mild climate, the Azores are a favorite winter resort. Oranges, grapes, olives and bananas are cultivated, and the trade in fruit with the Continent and North America is extensive. The safest harbor is that of Angra. Between 1431 and 1460 the islands were discovered for the Portuguese by Cabral. They were then uninhabited. In 1900, the population, consisting principally of Portuguese, mulattoes, negroes and settlers from Great Britain, numbered 256,291.

Azov, *Ah' zof,* **Sea of,** an arm of the Black Sea, almost wholly enclosed by Russian territory. Its greatest length is about 200 m., its width about 120 m. and its depth does not exceed eight fathoms. The total area is estimated at 15,000 sq. m. The waters are fresh and are used for drinking purposes. They contain an abundance of fish. The River Don falls into it near the town of Azov. The ports on its shores are Mariupol, Taganrog and Berdiansk.

Az'tec, the name of the tribe that inhabited a part of Mexico at the time of the Spanish invasion in 1513. Their origin is unknown and their early history vague. Their traditions refer to a country called Aztlan, lying to the northwest of Mexico, and their manuscripts record a departure from this land in the 11th or 12th century. Hieroglyphics on temples and pyramids record their history, and Humboldt made this people with their extensive knowledge of astronomy, agriculture, metal work and pottery, together with their many legends, the object of careful study and research

They were familiar with the arts of reading and writing, and education was in charge of the priests. They invented complex astronomical instruments and prepared lunar calendars. They cultivated agave and maize and carried on extensive agriculture, despite the fact that domestic animals were not used. In numbers and strength they were a formidable tribe and resisted successfully, for a long time, the invasions of the Spaniards. Montezuma was their ruler when Cortez made his invasion and conquered their territory. See CORTEZ, HERNANDO; MONTEZUMA.

Az'urite, a crystallized carbonate of copper found in copper ores. It is deep blue in color and is used in the preparation of pigment, for jewelry and for the tops of tables, according to the different grades. Small quantities occur near Lyons, France, and in Siberia.

B

BA'AL, among the Canaanites and Phœnicians a general term designating a local deity. Thus there was a Baal of Tyre, of Sidon, of Mt. Hermon, etc.; or Baal of the Covenant, Baal of Flies and similar Baals distinguished by some special quality. The worship of Baal by the Hebrews came as a result of their contact with the Canaanites. They even called Jehovah by the name of Baal. Elijah began a movement to purify the worship of its foreign elements, a work which was carried on, after the return of the exiles, by the later prophets.

Bab'bitt Metal, a name given to alloys of copper, tin and antimony, used to line bearings, axles and journals in machinery, to reduce friction. A mixture composed of copper, one part, tin, 24 parts, antimony, two parts, produces a tough, strong, serviceable metal.

Bab el Man'deb, a strait connecting the Indian Ocean and the Red Sea, and separating the southwestern part of Arabia from the Continent of Africa. The western coast rises to an altitude of 400 ft.; the eastern, to 865 ft. Near the African coast are the volcanic islets, known as the "Eight Brothers." The meaning of the name is the "gate of sorrow," so called because the strait offered many dangers to small vessels.

Ba'bel, Tower of, a structure which, according to *Genesis xi,* was erected in the plain of Shinar, Mesopotamia, by the descendants of Noah. Their purpose was to build a tower "whose top may reach unto heaven," so that they might gain great renown and prevent a scattering of their numbers over the face of the earth. This displeasure of Providence respecting this undertaking took the form of a confusion of tongues and a subsequent scattering of the people. *Babel,* another form of *Babylon,* has come to mean a confusion of sounds.

Baboon', a number of species of Old World monkeys repulsive in appearance but of great scientific interest. With the exception of one species they are natives of Africa and Arabia. They vary in size but have generally some strange marking or coloring which renders them conspicuous. Each hair is apt to be marked with several colors, though the general color is black, green or gray-brown. They live in herds in the open country and show great sagacity and cleverness in securing their food, which consists of fruits, vegetables or even young domestic animals. In attacking an enemy, they throw sticks, stones or any near-by object with great accuracy of aim.

Bab'ylon, the capital of the ancient Kingdom of Babylonia and at one time a city of magnificence and power. It was situated on the banks of the Euphrates about 350 m. from its mouth, and was the capital of the southern kingdom of Mesopotamia, as Nineveh was of the northern. The city had flourished for at least 1000 years before its destruction by fire in 689 B. C. When it was rebuilt by Nabopolassar, Babylon is said to have covered an area of 50 sq. m. and to have been surrounded by a massive wall of great height and thickness. Within its confines were the celebrated Hanging Gardens, the Tower of Babel, a great library of papyrus rolls and clay-tablets, and an astronomical observatory, besides private dwellings of magnificence. Excavations at the site of the ancient city have revealed many valuable tablets with cuneiform inscriptions that have thrown light upon much of the city's history. See BABYLONIA.

Babylonia, *Bab"y lo' ni a,* an ancient country of Mesopotamia, bounded on the s.w. by the Arabian Desert, on the e. by the Tigris, on the s. by the Persian Gulf, on the n. by Assyria. The name Babylonia is derived from that of

the capital city, Babylon, which in the Old Testament is applied to the entire country. According to Babylonian inscriptions the district consisted of several divisions; the southern part was known in early times as Shumer (the Hebrew Shinar), the northern part as Akkad (Accad). At a later period the name Akkad was extended to all Babylonia, and in the Old Testament Chaldea is sometimes used to designate the country. Babylonia was subject to annual inundations of the Euphrates and Tigris rivers, causing the country to produce an abundance of wheat, dates, barley, millet, grapes, apples and other fruits. The inhabitants of ancient Babylonia carefully controlled the inundations by building canals and embankments.

People. The ancient Babylonians were of Semitic stock, having a language closely resembling that of the Hebrews and Phœnicians. Their writing is known as cuneiform, or wedge-shaped (See Cuneiform Inscriptions). Their literature, dating from earlier than 2000 B. C., consisted of hymns, prayers, omens, epics, myths, legends and, later, historical annals (See Literature, subhead *Babylonia and Assyria*). Large numbers of commercial and legal tablets have also been found, of remote date, which give us valuable knowledge of the life, social conditions and political organizations of this people. The Babylonians were peculiarly a religious people; their religion was the foundation of their social and political life. They believed that they were surrounded by higher powers who watched over man and rewarded or punished him. The worship of the dead was also a prominent feature of their religion. In character, the Babylonians were gentle, fond of pleasure and of peaceful pursuits. They were very successful traders, importing cedar from the Mediterranean coast, teak from India, gold and silver from the East, while their merchants carried their exports into far-distant lands. Their system of government was that of a despotism, with viceroys ruling the provinces under the king.

It was in Babylonia that architecture was first practiced as a fine art. With only brick as building material, the Babylonians erected massive temples, palaces, and elevated gardens in imitation of mountain scenery. Their celebrated "Hanging Gardens," built in successive terraces to a height of 150 ft., were regarded by the Greeks as among the "seven wonders of the world." Although inferior in sculpture to their Assyrian neighbors, the Babylonians showed much proficiency in the engraving of hard stones, and they produced varied forms of sculpture—statues, friezes, carved basins and other kinds of reliefs.

History. Babylonian history can be traced back to about 4500 B. C. From that date until about 2300 B. C. Babylonia was divided up among a varying number of city states which usually enjoyed independence. About 2400 B. C. Babylon began to assume prominence, and 100 years later a great warrior, Hammurabi, united the southern states of Mesopotamia under his rule and made Babylon the seat of government. Hammurabi perfected the canal system of his country and laid the foundation for the future glory of Babylon. For about five centuries after 1782 B. C., Babylonia was under the rule of a people who came from Media, known as Kassites. In 1026 B. C. a native ruler occupied the throne, but Assyria had begun to interfere in Babylonian affairs, and from now on until the rise of the second Babylonian Empire (B. C. 625), there was much hostility between the two countries. In 710 B. C. Babylonia was reduced to an Assyrian province by Sargon II, and in 689 B. C. Sennacherib destroyed the city of Babylon. Soon after this, however, Assyria began rapidly to decline, and in 625 B. C. a successful rebellion freed Babylonia from Assyrian rule.

The new Babylonian Empire, founded by Nabopolassar, lasted less than 100 years. The most glorious period, 604-561 B. C., occurred during the reign of Nebuchadnezzar, a powerful monarch who raised Babylon to its highest summit of splendor. Nebuchadnezzar captured

Jerusalem in 586 B. C. and carried away the Jews into captivity. Tyre and Egypt also became the prey of this warrior. A line of weak kings followed Nebuchadnezzar, and in 538 B. C. Babylon fell before the conquering forces of Cyrus the Great. Babylonia now became a Persian province, remaining thus until Greek supremacy was established under Alexander the Great, who made Babylon his capital. Subsequently Babylonia was ruled by the Parthians, and in course of time sank into insignificance, leaving no traces of the former glory of her civilization. See ASSYRIA.

Bacchus, *Bak' us,* (Dionysus), *Di" o ni" sus,* the patron of not merely the baneful but the beneficent powers of wine, was the son of Jupiter and Semele. When he discovered vine culture and the means of pressing juices from the grapes, Juno drove him mad. In this condition he wandered about Asia until Rhea cured him and taught him her ceremonials and religious dances. These he introduced into Greece and into the Far East. Besides wine making he taught his disciples agriculture and the art of getting honey. Bacchus is represented in many ways. Sometimes he is delicate as a girl; sometimes bearded; sometimes horned. Often his long hair is bound with ivy. He is thought of as nude, as enveloped in a great mantle or as having a fawn's skin across his shoulder. A panther generally crouches at his feet, his symbol is a bull's head and he carries a blunted spear decked with vine leaves.

Bach, *Bahk,* **Johann Sebastian** (1685-1750), one of the greatest of German composers, born at Eisenach. The Bach family was preeminent in music for 200 years, four distinct branches of it being active at the beginning of the 16th century. Many stories are told of Sebastian's heroic efforts to obtain the means to advance in his art. His parents died when he was ten years old, and it is told that an elder brother, jealous of the child's talent, withheld from him musical books. After much laborious study, he managed at the age of 19 to obtain an appointment as organist at Arnstadt; and so great was his ability that after this he was never without employment. When 29 years of age he was chosen concertmaster to the Duke of Weimar, and during the period of this office he gave much time to the composition of sacred music. Three years later he was appointed to the office of chapelmaster to the Duke of Cöthen, which he held until 1723. After this he removed to Leipsic, where larger opportunities awaited him and where his greatest achievements were consummated. His last years were spent in total blindness.

The compositions of Bach for organ, voice and stringed instruments are numerous and have been held in such high esteem from his own day and time to the present that a knowledge of some of them at least has been considered an indispensable part of the education of anyone aspiring to a musical career. He perfected a form called the *fugue* and produced a large amount of sacred music. His best-known work is *The Well-tempered Clavichord.*

Bach'eller, Addison Irving (1859), an American novelist, born in Pierrepont, N. Y. After graduating at St. Lawrence University, he was on the staff of the *Daily Hotel Reporter* of New York City and was later a reporter for the Brooklyn *Times.* He was editor of the *Pocket Magazine* for a short time, joined the editorial staff of the New York *World,* and was the director of a magazine syndicate for several years. Among his stories are *The Unbidden Guest, Eben Holden, D'ri and I, Darrel of the Blessed Isles, Keeping Up With Lizzie* and *Charge It.*

Back'gammon, a game of chance played by two persons with two dice, 30 men, or checkers, and a board marked off into four quarters, each consisting of six points, colored alternately in red and black or white and black. Each player has 15 men, all of the same color, but different from those of his opponent. The first, or entering, table may be at either player's left hand. The throw of the dice by each player in turn determines the number of those points on the

first quarter of the board upon which men may be entered. A point is held, if occupied by two men of the same color, and cannot then be used by the opposing player; but one man may be removed from a point desired by his opponent, and he must later be started anew. After a player has placed all his men upon the first section, they may be advanced from left to right along that end of the board containing the entering section, and from right to left along the other end into the fourth section. Whenever either player gets all his men upon the fourth section, he may begin throwing them off; and the game is won by the first player accomplishing this result.

Ba'con, flesh of the hog cured by salting and smoking. Bacon is prepared from the sides and back of the hog, but the term is sometimes wrongly applied to the ham, which is cured in the same way. Bacon is nutritous and wholesome and is highly prized as an article of food. See MEAT PACKING.

Bacon, Francis (1561-1626), an English statesman and celebrated philosopher, born in London, the son of Sir Nicholas Bacon, who was lord keeper of the Great Seal for Queen Elizabeth. He was endowed with much natural talent and early showed unusual love of knowledge. In his 13th year he was sent to the University of Cambridge, but three years later went to France with an English embassy. Here he remained until his father's death in 1579. He was admitted to the bar at the age of 21, and two years later was elected to Parliament, where he began a long and conspicuous career. During these earlier years, in marked contrast to his later, he displayed much political independence.

Upon the accession of James I, Bacon made more rapid advancement. He served on a commission to arrange the terms of union of the English and Scottish crowns, was knighted in 1603, and became solicitor-general in 1607. In the growing conflict between James and Parliament, he strove for reconciliation, but took the King's side and gradually became more and more obsequious and self-seeking. He was appointed attorney-general in 1613, became lord keeper of the Great Seal in 1617, the following year attained to the high dignity of lord chancellor, with the title of Baron Verulam, and in 1621 was created Viscount of St. Albans.

But his enjoyment of the new honors was brief. In 1621 the growing opposition to the government took the form of a charge of bribery made against Bacon by the House of Commons to the House of Lords, of which he was a member. He confessed to having received large sums of money while cases were still pending, but maintained that this had never influenced his judicial decisions. It seems to be a fact that not one of his decisions was ever reversed as unjust. The sentence against him excluded him from Parliament and from court, fined him £40,000 and condemned him to imprisonment during the King's pleasure. The fine was remitted and imprisonment lasted only two days; but even in that age of laxity, it was impossible for him to resume his public career.

Bacon thenceforth devoted his life to literature and science, where his glory lies. He had already written many treatises, including discussions of the religious situation in England, several philosophical and scientific works, the first edition of his *Essays* (1597), *Advancement of Learning* (1605) and *Wisdom of the Ancients* (1609). His *Essays* appeared in their final enlarged form in 1625, and constitute perhaps his most-read writings. They cover a wide range of human thought and experience, and are written with a mastery of style almost unequaled for pith, pregnancy and clearness. In 1622 he published his chief historical work, *History of the Reign of Henry VII.* His *New Atlantis,* published in 1627, portrays an ideal "palace of invention" for scientific research, in the idealistic spirit of the Renaissance, and shows Bacon at his best.

Bacon probably rendered his greatest service to progress, however, in his philosophical and scientific writings. These he planned to group together into an

elaborate work in six parts, called the *Great Instauration,* which he left in an incomplete state. The first part of this, *Advancement of Learning,* and the second part, *Novum Organum,* have exerted the most influence. He repudiates the philosophy of the schoolmen as inadequate and useless, and advocates the new inductive method of study which leads to an investigation of the existing world of facts. He also greatly emphasizes the practical, or utilitarian, aim of scientific knowledge. The theories advanced by Bacon have developed into the scientific method which has won such wonderful achievements, and perhaps they fairly entitle him to be regarded as the father of modern science. See INDUCTIVE METHOD.

Bacon, Josephine Dodge Daskam (1876-), an American author, born at Stamford, Conn. She graduated at Smith College in 1898 and soon began to write short stories and articles for magazines. In 1903 she married Sheldon Bacon. Her works, which are characterized by humor and a pleasing style, include *Smith College Stories, The Imp and the Angel, Fables for the Fair, Whom the Gods Destroyed, Her Fiancé, An Idyll of All Fools' Day, The Madness of Philip, Memoir of a Baby, Biography of a Boy* and *Margarita's Soul.*

Bacon, Nathaniel (about 1648-1676), an English colonist, remembered chiefly as the leader of Bacon's Rebellion in Virginia. Of noble English birth, he was a collateral descendant of the great Lord Bacon, and, having become a lawyer, he emigrated to Virginia in 1673. There he became a popular landholder and leader. In defiance of Governor Berkeley he led an independent force against the Indians, severely defeating them in 1675. This caused Bacon's Rebellion (See BACON'S REBELLION), which ceased with Bacon's sudden death from swamp fever.

Bacon, Roger (about 1214-1294), a Franciscan monk and one of the earliest original investigators of nature, born in Somersetshire. After studying at Oxford and at Paris, he entered the Order of Franciscans, settled at Oxford and began to study and experiment. So remarkable were some of his discoveries that he was accused of dealing in black art and in 1257 was removed to Paris, where for ten years he was confined without books or instruments. On the accession of Pope Clement IV, however, who expressed a desire to see some of his writings, Bacon prepared his *Opus Majus,* an encyclopedia of grammar, logic, mathematics, physics, experimental research and philosophy. For several years after the death of Clement, Bacon was free from open persecution, but in 1278 he was again imprisoned and did not return to Oxford for ten years. Bacon was an extraordinary genius. He invented the magnifying glass, made several chemical discoveries and he announced the prevailing errors in the calendar.

Bacon's Rebellion, an uprising of Virginian colonists, in 1676, under a wealthy lawyer, Nathaniel Bacon, against the government, which was headed by Governor Berkeley. Unfair taxes, enforcement of the navigation laws and, finally, the governor's inactivity in resisting the Indians were causes for the outburst. Having raised a company, Bacon was refused a commission to fight the Indians. Notwithstanding, he marched out and, though a commission was later granted, he was proclaimed a rebel. Returning from the frontier, he defied Berkeley by burning Jamestown, when he died suddenly of malarial fever. The backbone of the rebellion was thus broken. Twenty-three of Bacon's most prominent followers were executed.

Bacteria, *Bak te' ri a,* minute, one-celled plants of simple structure. These bacteria are of two kinds: those which live upon dead organic matter and are called saprophytes; and those which live upon living organic matter and are known as parasites. The parasites are the harmful bacteria and are the ones which cause disease by excreting into blood and tissues of infected persons poisonous substances, called toxins. The different bacteria are known by their dif-

ferences in form; thus the bacterium which causes erysipelas is a spherical cell which is found with others of its kind in a long chain; that causing anthrax in cattle is rodlike in form and often is found in chains; that of blood poison, or tetanus, is rodlike, but has numerous hairlike projections, called cilia, at one end; that of diphtheria are also rod-shaped, but are swollen at one end. Typhoid fever, tuberculosis, cholera and many other diseases have each the bacterium by which the disease is spread and so rendered infectious.

Many bacteria are capable of free movement by means of their cilia. They live upon various nutritive substances, and when this nourishment is exhausted, if unable to move, they form spores and go into a resting state, in which they are able to live for a long time and to resist many of the ordinary agents of destruction. Most of the bacteria require oxygen in order to live, but others can live without it, and to a few its presence is even harmful.

Flies and mosquitoes are carrying agents of many harmful bacteria and thus spread disease. Typhoid fever bacteria thrive in milk and in water and are so transmitted. For many of the bacterial diseases antitoxins have been discovered; for the other bacterial diseases it is said that the extermination of the insect carriers and the sterilization of the milk and the water supplies will effectually check their spread. See INFECTIOUS DISEASES; ANTITOXIN; VACCINATION; SURGERY.

Badeau, *Bad o′,* **Adam** (1831-1895), an American soldier, born in New York. Early in the Civil War he was attached to the staff of General Sherman and was severely wounded at Port Hudson. Later he was on General Grant's staff, and in 1869 he retired as brevet brigadier-general in the regular army. From 1869 to 1881 he was secretary of legation and consul-general at London, and accompanied Grant on his tour around the world. From 1882 to 1884 he was consul-general at Havana. His publications include *Military History of Ulysses S. Grant* and *Grant in Peace.*

Baden, *Bah′den,* one of the States of the German Republic, the fourth in size and the fifth in population. It is bounded by the Rhine-Palatinate, Alsace, Switzerland, Württemberg, Hohenzollern, Bavaria and Hesse, and covers an area of 5823 sq. m. The Black Forest, a narrow mountain range heavily wooded, stretches along the Rhine Valley for about 100 m. from Basel to Pforzheim. The loftiest peaks are Feldberg (4900 ft.) and Belchen (4600 ft.). The mineral supplies consist of iron, coal, zinc and nickel, and the agricultural products include oats, wheat, barley, potatoes, rye, tobacco, hemp, wine and sugar beets. The cultivation of fruit yields rich returns; wine is one of the staple products of Baden. Among manufacturing interests are the textile industries, watchmaking and the manufacture of leather, paper, jewelry, mirrors, woodenware, cigars and machinery. Mannheim, one of the most crowded and busiest ports on the Upper Rhine, represents the center of its commerce. The capital is Karlsruhe; other important towns are Baden, celebrated for its mineral springs, and Heidelberg, which has the oldest university in the present German Republic.

The Mark of Baden was established in 1074. In the course of the next seven centuries it was enlarged by several additional tracts of territory and became the Grand Duchy of Baden in 1806. As such, it became a part of the German Empire in 1870; but a republican state of Germany in 1919.

Baden-Powell, *Ba′ den-Po′ el,* **Sir George Smyth** (1847-1898), an English diplomat and political writer, born in Oxford. After traveling in New Zealand, Australia and the West Indies, he was elected to Parliament as a Conservative in 1885. He investigated the dispute between Canada and the United States concerning the Bering Sea fisheries, and was expert agent for the British Government in the conduct of the British case

Paris, in 1893. As an author he is known for his *New Homes for the Old Country, The Truth About Home Rule, The Land Systems of India* and *Saving of Ireland, Industrial, Financial, Political.*

Baden-Powell, Sir Robert Stevenson Smyth (1857-), a British soldier, born at London. When 19 he joined the hussars, with whom he served in India, Afghanistan and South Africa, and in 1897 he was promoted lieutenant-colonel, commanding the Fifth Dragoon Guards. In the Boer War, 1899-1900, he won fame by his stubborn defense of Mafeking, Cape Colony, holding the town with a small force against repeated attacks during seven months, or until May, 1900, when the third relief column sent to his aid finally reached him. For this the Queen promoted him major-general. Baden-Powell has written widely on his campaigning and on military subjects. He also originated the Boy Scout movement. See Boy Scouts of America.

Badger, *Baj' er,* a small fur-bearing animal of the Weasel Family allied to the skunk and the weasel, and like them having a conspicuous coloration and a disagreeable odor. The body of the American badger is broad and low and covered with a soft fur, which, upon the head and legs, is lengthened into rather coarse hair. The head is broad, with rounded, furry ears and formidable jaws. The legs are short and both the fore and hind feet are armed with strong claws which enable it to burrow with great rapidity. In color the body appears a dirty gray, but each hair is marked with three colors—black, gray and tawny yellow; the head is white except for a dark, triangular mark upon the chin and a pair of gradually widening black bands from above the corners of the mouth and enclosing the eyes and the ears. The badger lives upon both animal and vegetable food. In America it was once found throughout all the prairie states; now it is rarely seen east of the Mississippi. It preys upon squirrels, gophers and field mice, which it catches at night in their holes. The badger's burrow is long and rambling and in temperate regions extends below the frost line, so that the badger can remain active all winter, feeding upon other burrowing animals. Farther north it hibernates.

Bad Lands, the name given certain lands, lying partly in Nebraska and partly in South Dakota, because they have no vegetation. They have been eroded by wind and water into hills and valleys of various sizes and forms, making them objects of interest to the geologist and tourist.

Baf'fin's Bay, a gulf or sea on the northeast coast of North America, lying between that continent and Greenland. It is about 800 m. long; its greatest depth is 6890 ft., its average width, 280 m. There are navigable channels along the coasts for four months a year; it is seldom free from ice. The principal rocks are gneiss and granite, and there is extensive whale and seal fishing. It was explored by Baffin in 1615, and there are now Danish settlements on Whale and Disko islands.

Bagatelle, *Bag"a tel',* a game somewhat resembling billiards. The table or board consists of a long, flat board covered with cloth and having at one end nine cups or sockets just large enough to receive the balls. There are nine balls—one black, four white and four red. The balls are driven into the sockets with a cue similar to a billiard cue.

Bag'dad, a city of Mesopotamia, capital of the province of Bagdad, situated on the Tigris River about 500 m. above its mouth. The streets are unpaved, narrow and winding; the houses are built of yellowish-red brick, with flat roofs on which the people eat and sleep in summer. Features of interest are the mosques, about 30 in number, the tombs with their glittering domes and lofty minarets, the numerous shrines where pilgrims linger, the citadel with its high clock tower and the hotels for visitors and merchants. The direct route of transportation from Persia and India is now by way of the Persian Gulf and the Suez Canal; hence Bagdad has lost its importance as a trading center. The manufactures include silks, carpets, orna-

mental fabrics and leather. Staple exports are wool, hides, dates and gum. The silk of Bagdad and its brilliantly-colored textiles were long famous. During the 12th century the city was one of the wealthiest and most splendid cities in the world, and was commonly known as the "glorious city." During the World War, Bagdad was the objective of a British expedition under command of Gen. Townshend who was compelled to surrender in April, 1916. But a second expedition under command of Gen. Maude occupied the city in March, 1917, and made it the base from which to move in support of Gen. Allenby attacking Turkey from Egypt. Estimated population 150,000.

Bagdad Railway. A road planned to extend from Haidar Pasha, on the Bosporus, opposite Constantinople, to Bagdad. At Aleppo, Syria, the line divides. The main line runs east across ancient Mesopotamia to Mosul, on the Tigris, thence south down the Tigris, to Bagdad and Basra, at the head of the Persian Gulf. Interest in this road is based on the fact that its construction was eagerly sought by Germany since it would have been such a great factor in her plans for world dominion. Bankrupt and incompetent Turkey could not build it. Whatever nation controlled such a road would control Turkey economically; and economic control tends rapidly to pass into political control. Germany had secured a favorable concession and was actively engaged in building the road when the World War opened. Many writers see in this activity one of the causes of the war itself. But since as a result of that War, Turkey has lost control over Mesopotamia and most of her former Asiatic Empire and the Teutonic Alliance in Europe was completely overthrown, the Bagdad railway has lost its political importance. It is destined, however, to be one of the great arteries of commerce between Europe to the Orient.

Bag'pipe", a musical wind instrument of great antiquity, which was in use among the ancient Greeks. Today it is found among the peasantry of France, Poland, Italy, Ireland and Scotland, having been introduced into the last-named country from England. It is composed of an air-tight leathern bag, and pipes, into which the air is forced by the arm of the performer. The ordinary Highland bagpipe consists of four pipes. The first of these is called the chanter, by means of which the melody is produced through the use of a series of lateral holes. The three other pipes are called drones, of which two give out a monotone in unison with one of the lowest notes of the chanter, and the third emits a note an octave lower.

Bahama *Ba ha' ma,* **Islands,** a group of islands forming a part of the British West Indies, lying s. e. of Florida and n. of Cuba and Haiti. Of the whole group, 20 are inhabited, and the largest of these are Grand Bahama, Great Abaco, Little Abaco, New Providence, Harbor Island and Andros Island. They have been formed chiefly of wind-blown coral sand, are now fertile and yield fruits as well as cotton, sisal, maize and timber. Columbus first discovered the islands in 1492, and for a long time they were alternately in the hands of the Spanish and the English.

Bahia, *Bah e' ah,* or **Sao Salvator,** *Soun Sal" vah dor',* a maritime city of Brazil and capital of the state of Bahia, on the Bay of All Saints. Its public buildings are attractive, and the easily accessible harbor makes it one of the principal ports of Brazil.

Baikal, *Bi kahl',* a lake in southern Siberia, the third in size in Asia and the largest fresh-water lake of the continent. It is 390 m. long, varies in breadth from 20 to 50 m., lies 1513 feet above sea level and occupies an area of 13,000 sq. m.

Bailey, Liberty Hyde (1858-), an American educator, one of the best known authorities on agriculture and rural conditions. He received his college training at the Michigan Agricultural College. After serving as assistant to Professor Asa Gray at Harvard and for four years at Michigan Agricultural College, he was professor of horticulture at the New York State College of Agri

culture and Cornell University at Ithaca. In 1903 he became director of that institution and held the position until his retirement in 1913. Professor Bailey has been an authoritative and voluminous writer on botany and country life. His most important works include—*Lessons with Plants; Botany, an Elementary Text for Schools; The Nature-Study Idea; The Country-Life Movement.* He is also the editor of the *Standard Cyclopedia of Horticulture; Cyclopedia of Agriculture,* the *Rural Science Series, Rural Text Book Series, Rural Manual Series.*

Bainbridge, *Bane'brij,* **William** (1774-1833), an American naval officer, born in Princeton, N. J. He was captain of a merchant vessel at the age of 19, and was appointed lieutenant-commandant in 1798. In command of the frigate *George Washington* he carried the commercial tribute to Algiers and the diplomacy of his relations with the dey was highly approved by the United States Government. In 1801 he cruised the Mediterranean in the *Essex,* and during the war with Tripoli was taken prisoner while commanding the frigate *Philadelphia.* His next service was in the War of 1812. As commodore of a squadron consisting of the *Constitution,* the *Essex* and the *Hornet,* he captured the British frigate *Java,* and received a gold medal for the achievement. In 1815 he returned to the Mediterranean, but too late to take part in the war with Tripoli.

Baird, Spencer Fullerton (1823-1887), an American naturalist, born at Reading, Pa., and educated at Dickinson College, Carlisle. Later he became professor of natural sciences in that institution. He also studied at the College of Physicians and Surgeons in New York City, and became assistant secretary, and finally secretary, of the Smithsonian Institution at Washington, D. C. Mr. Baird wrote quite extensively on birds, reptiles and fish. He founded the National Museum in 1850, and was the first commissioner of fish and fisheries in the United States. While holding that position he was chiefly instrumental in establishing the present system of fish culture. His most noted writings are *The Mammals of North America* and *History of North American Birds.*

Baker, James Hutchins (1848-), an American educator, born in Harmony, Me. He graduated at Bates College, Maine, in 1873, receiving the degree of doctor of laws in 1892, in which year he became president of the University of Colorado. President Baker has become widely known through his originating the plan which led to the report of the National Committee of Ten on secondary education. In 1907 he became president of the National Association of State Universities. He is the author of *Elementary Psychology, Education and Life* and *American Problems.*

Ba'ker City, Oregon, the county seat of Baker Co., 357 m. s. e. of Portland, on the Powder River and on a line of the Oregon Railroad & Navigation Company. It is in the midst of the Eastern Oregon mining region, of which it is a trade center. The principal industries are farming, stock raising, lumbering and mining. Gold and iron are the leading minerals mined. Live stock, lumber and wool are the chief exports. Among the industrial plants are ironworks, brickyards, and extensive saw and planing mills. Prominent features of the city are the Masonic Temple, opera house and a natatorium. Settled in 1860, Baker City was incorporated in 1872 and was chartered in 1898. It is now administered under the commission form of government. Population in 1920, 7,729.

Ba'kersfield", Cal., a city and the county seat of Kern Co., 85 m. n.w. of Los Angeles, on the Kern River and on the Atchison, Topeka & Santa Fe, the Southern Pacific and other railroads. Situated in a productive oil, fruit-growing and live-stock region, the city has important commercial interests. There are various manufactories and other industrial establishments, including foundries, machine shops, flour mills, planing mills, a tank factory and meat-packing plants. Water power is derived from the Kern River, which is

also utilized for irrigation purposes. The city has a public library and fine county buildings. Bakersfield was settled in 1872. Population in 1920, 18,638.

Ba'king Pow'der, a mixture used in raising bread, biscuits, etc., as a substitute for yeast. It consists of bicarbonate of soda, cream of tartar and starch or flour. The starch keeps the cream of tartar and soda dry, preventing any chemical action until ready for use. When mixed with water, carbonic acid gas is made. This gives lightness by puffing up the dough, causing it to rise. Bicarbonate of ammonia is sometimes used instead of bicarbonate of soda, and alum is sometimes similarly substituted. Both are objectionable and injurious to health. Ammonia is easily detected by the odor given off when a quantity of the powder is put into water and boiled. Alum dissolves in cold water and is detected by the taste. See ALUM; AMMONIA; BREAD.

Balaam, *Ba' lam,* a character of the Old Testament, who figures in two different narratives. In *Numbers xxxi* he is represented as a Midianitish counselor, who is killed in battle. The more commonly known narrative, found in *Numbers xxii-xxiv,* makes him a native of Mesopotamia, who, at the suggestion of Balak, King of Moab, leaves his home to pronounce a curse upon the Israelites. By a miracle he is compelled, instead, to bless them.

Balaklava, *Ba" la klah' vah,* a small seaport on the Black Sea in the Crimean Peninsula and the scene of one of the most stubborn battles of the Crimean War, fought between the Russians and the British Oct. 25, 1854. Tennyson's poem *The Charge of the Light Brigade* commemorates the unsuccessful charge of the British cavalry in this battle. See CRIMEAN WAR.

Balance of Power, in diplomacy the term used to express an agreement among nations, whereby one nation will not be allowed to secure a preponderance of power to the disadvantage of others. This policy was first adopted in Europe in the 15th century to check the growing power of Charles V. It was again resorted to after the Treaty of Utrecht to hold in check Great Britain, France, Germany, Austria, Russia and Italy. The invasion of Turkey by Russia in 1853 was declared by France, Great Britain, Austria and Prussia to be a violation of the agreement to preserve the balance of power and these nations formed an alliance against Russia to prevent the aggression. The Congress of Berlin in 1878 also restrained Russia from reaping any permanent advantages gained by the Treaty of San Stefano. Furthermore, it is because of this agreement among the great powers of Europe that the atrocities in the Turkish Empire were not stopped by outside force. The aggression of Russia in the Far East, which led to the Russo-Turkish War, is also an illustration of the violation of the agreement.

Balances. See WEIGHING MACHINES.

Balboa, *Bahl bo' ah,* **Vasco Nuñez de** (1475-1517), the discoverer of the Pacific Ocean, born in Spain. He came to America at the age of 25 and explored the southwestern coast of the Caribbean Sea. In 1513 he set out from Darien to find the gold of Peru and the ocean beyond the mountains. On Sept. 25 he saw the waters of the South Sea, and four days afterward took formal possession of it in the name of the King and Queen of Castile.

Bald Eagle. See EAGLE, subhead *Bald Eagle.*

Bal'der, the Beautiful, in Northern mythology, son of Odin by Frigga, the personification of the sun, and the god of light and spring. He was cherished by all the gods except the jealous Loki, god of fire and of evil. Frigga, fearing for her son, obtained a promise from all things in the universe, barring the mistletoe, that they would not injure Balder. So the gods, in sport, amused themselves by hurling their weapons at him, only to see them fall harmless. But one day Loki fashioned a dart of mistletoe. With malicious intent he gave it to Hodur, Balder's twin brother, who was the blind god of darkness. Unwittingly he hurled

this weapon at the smiling god of light, who fell dead. Vali, personification of lengthening days, avenged his death by slaying Hodur.

Bald'win, James Mark (1861-), an American psychologist, born in Columbia, S. C. After graduating at Princeton he studied in the universities of Berlin, Leipsic and Tübingen. He taught in Princeton, Lake Forest University and the University of Toronto, and became professor of psychology in Princeton University in 1893. He has held important positions in many associations for furthering the study of psychology and sociology. For his work on social ethics he was awarded the gold medal by the Royal Academy of Denmark. He was one of the founders of the *Psychological Review* and editor-in-chief of the *Dictionary of Philosophy and Psychology.* Among his books are *Handbook of Psychology, Mental Development in the Child and the Race, Social and Ethical Interpretations in Mental Development* and *Development and Evolution.*

Baldwin, Matthias William (1795-1866), an American inventor and locomotive manufacturer, born in Elizabethtown, N. J. The *Ironsides,* the first practical locomotive made in America, was completed by him in 1832. He founded the Baldwin Locomotive Works in Philadelphia. By his generous gifts to educational institutions he became recognized as a public benefactor.

Balearic Isles, *Bal" e ar' ik Iles,* a group of islands in the Mediterranean Sea, off the coast of Valencia. They include Malorca (Majorca), Minorca, Formentera, Iviza and Cabrera and constitute one of the provinces of Spain. Their total area is 1936 sq. m. A fairly fertile soil yields olives, grapes and other fruits in abundance. Port Mahon, in Minorca, is one of the most excellent harbors in Europe. They were united with Aragon in 1343. Parma, in Malorca, is the capital. Population in 1901, 311,649.

Balfe, *Balf,* **Michael William** (1808-1870), a British composer, born in Dublin. He began his musical education under his father and gave his first public performance during his seventh year. At the age of 16 he took a prominent part in an opera produced at Drury Lane. He began composing in 1825, and his first opera was produced at Palermo in 1830. He was a prolific composer, and his operas, though lacking in dramatic force, are remarkable for their melodious effects. His best-known operas are *The Bohemian Girl, The Rose of Castile* and *The Talisman.*

Balfour, *Bal' foor,* **Arthur James** (1848-), an English statesman. He was educated at Eton and Cambridge, and entered Parliament in 1874 as a Conservative member for Hertford. In 1886 he was appointed chief secretary for Ireland, and in this position he showed astonishing strength of will and efficiency, bringing peace and justice to the island. Mr. Balfour made a reputation during the next five years as a party leader, by his debates on the Irish question, and in 1891 became leader of the Conservatives in the House of Commons. He was prime minister from 1902 to 1905, and after the Liberal victory of 1906 became the leader of the opposition during the Parliamentary struggles which culminated in the removal of the veto power from the House of Lords. In November, 1911, he resigned his leadership, after swinging his party to a reluctant acceptance of the Liberal bill, and was succeeded by Mr. A. Bonar Law.

Baliol, *Bale' yul,* **John de** (about 1249-1315), King of Scotland. Both Robert Bruce and Baliol claimed the Scottish throne upon the death of Princess Margaret of Norway in 1290. Edward I of England, called as arbitrator, decided in favor of the latter. The tyranny of Edward becoming irksome to Baliol, he concluded a treaty with France, then at war with England, but was defeated by Edward and forced to surrender his crown.

Balkan, *Bol' kahn,* **Mountains,** a mountain range in southeastern Europe, forming a part of the Carpathian system. It extends from the Iron Gates of the Danube through Servia, forms the borders

of Servia and Bulgaria, turns east and reaches the Black Sea at Cape Emineh. The altitude of its highest peaks is about 7000 ft. There are six passes, the Shipka, Rosalita and Troyan passes being at elevations of from 4000 to 5000 ft. The Troyan forms the overland route between Vienna and Constantinople. Among the deposits are copper, iron ore and lead.

Balkan War, a war waged against Turkey by the confederation of the Balkan states—Bulgaria, Servia and Montenegro—and Greece. It began in October, 1912, and continued until August, 1913. The entire conflict is divided into two periods, known respectively as the first and the second wars.

Causes. The causes of the war extend back over a period of more than 500 years, and may be classified as racial, religious and political. During this period the native inhabitants of the Balkan states have cherished an intense hatred for the Turk, and during a good portion of this time bitter feuds have also existed between the inhabitants of the various states. The Turkish Government seldom interfered in these feuds, realizing that so long as the states were engaged in fighting each other, they would not combine against the Turks.

The Treaty of Berlin in 1878, which closed the Russo-Turkish War, left Bulgaria subject to Turkey, and the regions known as Macedonia and Albania wholly under Turkish rule. The region known before the war as Macedonia, and lying between Greece and Bulgaria, contains among its inhabitants Greeks, Bulgarians and Turks, but the Greeks and Bulgarians combined far outnumber the Turks.

Most of the atrocities committed in this region since the Treaty of Berlin have been due to feuds between these nationalities. For the reason already mentioned the Turkish Government seldom interfered, and the leading European nations generally known as the great powers refused to interfere because they feared that such interference might disturb existing political conditions among the Balkan states. Moreover, most of the native inhabitants of these states are members of the Greek Church or some other Christian denomination. Thus racial hatred was intensified by religious hatred. The tributary states were also restive under Turkish rule, which they for a long time wished to throw off. Under these conditions, a conflict sometime was inevitable.

The First War. In 1908 Bulgaria declared her independence from Turkey. From that time to the breaking out of the war she organized, drilled and equipped an army of 200,000 men. When placed in service, this army, considering its size, proved to be one of the most efficient in Europe. Turkish misrule had become intolerable, and under the lead of Bulgaria the states secretly formed a confederation and prepared for war.

Montenegro declared war on Oct. 8, 1912, and immediately invaded the Turkish Sanjak of Novi Bazar. Bulgaria, Servia and Greece mobilized their forces and began the invasion of Turkish territory. The campaign was carefully planned. Each army was to invade and take possession of the territory adjoining its own country, and all armies were to move forward in concerted action. The Turks were overwhelmingly defeated at all points. The Montenegrins captured Skutari, Podgoritza and Mitrowitza. The Bulgarian army under King Ferdinand in person, but under the immediate command of General Savoff, who was also commander-in-chief of the allied armies, invaded Thrace, and on Oct. 20 invested Adrianople. At the same time, a second Bulgarian army moved eastward and captured Kirk Kilisse, which closed the door to the East. The Bulgarian army advanced upon Constantinople and gained command of all roads leading to that city, until finally at Tchatalja they were within 20 m. of Constantinople, and their lines extended from the Black Sea to the Sea of Marmora. Meanwhile the Servian forces under King Peter had captured the stronghold of Novi Bazar, and the important towns of Kumanovo and Uskub. The Greeks captured Elas-

sona and Saloniki. The Bulgarians laid siege to Adrianople.

Within a little over a month after the beginning of hostilities the Turks had been defeated at all points except at Adrianople. The Turkish Government, realizing the hopelessness of the struggle, asked the European powers to intercede, but they declined. On Nov. 14 the Turkish grand vizier instructed Nazim Pasha, the commander of the Turkish army, to open negotiations for ending the war. An armistice was agreed upon, and delegates from Turkey and the confederated states met in London on Dec. 13 to negotiate a treaty. Turkey strenuously resisted the demand of the allied states that she cede Adrianople, and six weeks were spent in fruitless negotiations, after which the delegates returned home. Hostilities were at once resumed. The Bulgarians won victories in Gallipoli; the Greeks captured Janina; on March 26, 1913, Adrianople was entered by the Bulgarian army; and the Montenegrins occupied Skutari on Apr. 23. Pressure brought by Austria, however, compelled the Montenegrins to evacuate the city and to relinquish all claims to it.

Peace delegates again met in London, and on May 30 signed a treaty, by virtue of which Turkey agreed to abandon all territory on the Continent of Europe west of a line extending from Enos on the Ægean Sea to Midia on the Black Sea, with the exception of Albania, over which the Sultan of Turkey was to be nominal suzerain.

The Second War. The treaty was not satisfactory to Servia or Greece, these countries feeling that they had been deprived, largely through the dictation of the great powers, of much of the territory conquered by their armies. Furthermore, before the allied states began the war they had agreed upon the division of the territory which they expected to conquer. By this agreement Albania was to have been divided among Servia, Montenegro and Greece. Bulgaria was to have western Thrace, and Macedonia was to be erected into an independent principality. Making Albania independent deprived three of the allies of much coveted territory, and Servia and Greece demanded that Bulgaria reimburse them in a measure by granting them portions of Macedonia. This Bulgaria refused to do. During the negotiations of the treaty, dissensions among the allies became increasingly frequent, and by the latter part of June Greece and Servia were at war with Bulgaria.

The Bulgarian forces had underrated the strength of their opponents and suffered severe reverses. At this stage of affairs Roumania entered the field against Bulgaria, under the claim that she should have been granted territory in northeastern Bulgaria as a reward for remaining neutral during the war. The Turks reoccupied Adrianople.

Under these conditions Bulgaria was compelled to sue for peace, and delegates met in Bukharest and concluded a treaty on Aug. 10, 1913. By the terms of this treaty the Turkish boundary was moved westward to the Maritza River, thence northward and eastward to the Black Sea at Midia. This restored Adrianople and Kirk Kilisse to Turkey. Roumania gained the territory she demanded and thus extended her seacoast. Bulgaria extended her territory southward to the Ægean, and Greece was granted an extent of seacoast. Servia was granted some extensions of territory, but was unable to gain an outlet to the sea.

Balkash, *Bal kahsh'*, a salt lake in Russian central Asia, the fourth in size on the Continent of Eurasia. Its length from southwest to northeast is 330 m., its breadth varies from 6 to 54 m. The total area is 8600 sq. m. The Ili is the most important river flowing into the lake; the largest island it contains is the Utch-Aral. There are no important fisheries, and ice and shallow waters make navigation irregular.

Ball Thomas (1819-1911), an American sculptor, born in Charlestown, Mass. He first took up painting, which he studied in Italy, but in 1851 he began to devote himself to sculpturing. He resided in Florence until 1897, when he came to

Montclair, N. J. His most familiar statues are the Webster statue in Central Park, the equestrian statue of Washington in Boston and *Emancipation* in the city of Washington.

Bal'lad. See POETRY, subhead *Ballad.*

Bal'lard, Wash., a city of King Co., about 5 m. n.w. of Seattle, on Salmon Bay and on the Northern Pacific, the Great Northern and other railroads. The lumber interests are extensive, and, with a good harbor, the trade in this commodity is important. There are shipbuilding yards and foundries and machine shops. Settled in 1882, Ballard was incorporated in 1890. Its recent growth has been rapid. Population in 1919, 15,000.

Balloon', a bag made of paper, linen, silk coated with varnish, or other material that will hold gas, and filled with gas lighter than air at ordinary temperature so that it will rise and float in the atmosphere. The first balloon was constructed by the Montgolfier brothers in France in 1783. They obtained the idea from the clouds, and concluded that a bag filled with a substance as light as the clouds would rise and float in the atmosphere. They made a linen bag 30 ft. in diameter and filled it with hot air. This experiment was successful and attracted wide attention. The toy balloons common on the Fourth of July are small Montgolfier balloons, and large balloons of this type are still used for exhibitions.

The first gas balloon was made in Paris under the direction of Professor Charles. This balloon was filled with hydrogen a few months after the Montgolfier experiment, and ascended over 3000 ft. and traveled more than 15 m. Later balloons have been constructed on one or the other of these types, but the gas balloon alone is worthy of attention. The modern balloon consists of a large bag open at the bottom and having a valve for allowing the escape of the gas at the top. The bag is covered with a netting of cord, to which the basket or car is attached. The valve is closed by a spring and opened by a cord, which is within easy reach of the aeronaut. Balloons are filled with illuminating gas, since it is cheaper than hydrogen and does not escape so readily through pores in the bag. Since 30 cu. ft. of gas will lift only one pound weight, balloons designed to carry heavy loads or for long voyages are necessarily very large. Those 40 or 50 ft. in diameter are not uncommon, and balloons exceeding 100 ft. in diameter, with a lifting capacity of over 27 tons, have been constructed. Balloons are useful for scientific observations on the atmosphere and for military purposes. By the use of delicate instruments the pressure, humidity and temperature of the air at great altitudes can be ascertained. In 1862 Glaisher reached an altitude of 29,000 ft., and in 1901 Berson and Suring, by inhaling oxygen, were enabled to reach 31,000 ft. Unmanned balloons have ascended as high as 13½ m. Several long journeys have been made. The first was by John A. Wise in 1859 from St. Louis to Henderson, N. Y. This was exceeded by Count de la Vaulx in 1900, who went from Paris to Korosticheff, Russia, 1193 m. In 1897 Salomon Andrée and two companions attempted to reach the North Pole from Spitzbergen by balloon, but the unfortunate explorers were never heard from. Formerly the balloon constituted an important part of an army's equipment, but it has been replaced by the aeroplane. See AERONAUTICS, subhead *Dirigible Balloon.*

Bal'lot. See AUSTRALIAN BALLOT.

Ball's Bluff, Battle of, one of the earliest important engagements of the Civil War, fought Oct. 21, 1861, near the Potomac above Washington, between about 2000 Federal troops of McClellan's force, under colonels Baker and Devens, and a Confederate force in ambush. After a sharp and murderous fight, the Union troops were driven down the bluff, and many were drowned while trying to cross the river. Fully 1000 men were lost.

Balm, *Bahm,* a handsome, showy, wild plant of the Mint Family growing in damp woodlands or in shady groves. The stem is straight, square and tall, somewhat downy without and fibrous within. The leaves are rather long and pointed.

almost stemless, with a prominent midrib. They are arranged opposite each other on the stem and at right angles to the pair above and below. Each plant bears one globular flower head surrounded by numerous green or reddish, pointed, drooping leaflets, collectively called an involucre. The heads are made up of many dry, tubular cups from less than half of which proceed the long, pale purple, bright scarlet or white, trumpetlike corollas. The margins of the corollas are divided into two long, narrow lobes, which in scarlet varieties look like tongues of flame. Balm is pleasantly scented and was once commonly used as a medicine. It grows from New York south and west as far as the Mississippi and flowers all summer. In different localities the plant is known as bee balm, horsemint, Oswego tea and bergamot.

Balm of Gilead, *Gil' e ad,* a small tree of the Balsam Family from whose trunk exudes a yellow gum also known as balm of Gilead. The gum is aromatic and is used as a body oil by the Turks and Arabians, in whose countries the tree grows. Other plants such as the sweet balm, balsam poplar and silver fir are also known as balm of Gilead, since all have aromatic foliage.

Balmor'al Castle, a royal residence of Great Britain, situated on the River Dee, in West Aberdeenshire, Scotland. An estate of 40,000 acres surrounds it, and it commands a magnificent prospect of the surrounding mountain scenery. The castle is of gray granite, built in Scotch baronial style, with a tower 80 ft. in height and 35 ft. square surmounted by a turret 20 ft. high.

Balsam, *Bol' sam,* a term applied to various plants and to the resinous products of many plants. True balsams are exudations, which contain, not only resins and volatile oils, but also benzoic or cinnamic acid (See BALM OF GILEAD). However, any resinous drugs having a sweet, penetrating odor and healing properties are called balsams. They are used as a basis of perfumeries and medicines, and are generally solid or gummy in form, but easily soluble in alcohol or ether. See FIR; BALM.

Balsam Tree. See FIR.

Baltic, *Bol' tik,* **Sea,** a body of water in northern Europe, partly enclosed by Sweden, Russia, Denmark and Germany, and connecting with the North Sea through the channels, the Sound, Great Belt, Little Belt, Cattegat and Skagerrak. Its greatest length is 930 m.; its width varies from 50 m. at the southern extremity to 425 m. between Stockholm and St. Petersburg. Its area is about 160,000 sq. m. The islands contained within its limits are Åland, Gottland, Dagö, Rügen and Bornholm. The waters contain only a small percentage of salt. During the winter months navigation of the Baltic is suspended. The shipping and commerce are at other times very important. It has long been sought by various powers. The important ports are Kiel, Lübeck, Danzig, Stettin and Königsberg; Petrograd, Riga, Cronstadt, Helsingfors and Åbo, Stockholm, Malmö and Karlskrona and Copenhagen. The Kiel Canal (See KIEL CANAL) connects with the North Sea and saves the numerous dangerous passages through the straits.

Baltimore, *Bol' ti more,* **Md.,** the chief city of the state and the seventh city of the United States, is situated at the head of tidewater on the middle and northwest branches of the Patapsco River, 14 m. above Chesapeake Bay, 94 m. s. of Philadelphia, 42 m. n. e. of Washington and on the Baltimore & Ohio, Pennsylvania and other railroads. The land between the two branches of the river forms a peninsula, with south and southeast extensions. The North Branch extends inland to near the center of the city, forming a commodious harbor, known as the Basin. The peninsula is occupied by warehouses, grain elevators, freight depots and factories. The population of this section is largely of foreign extraction. Jones Falls, a small stream, divides the city north of the Basin into east and west sections. This stream is now partially covered and the street called the Fallsway. The white stone bridge on

North Avenue is one of the greatest triumphs of engineering skill in the country. The city has an area of 82 sq. m. That part of the city east of Jones Falls is divided into the southeast section, known as Fells Point, and the east section, frequently called Old Town. The modern residential section is on the west side of the falls, occupying the north and northwest sections of the city. The business section adjoins the Basin and extends several blocks north and west. Baltimore Street, extending east and west, is the principal business street. The wholesale section extends north from Pratt Street and is bounded by Paca, Baltimore and Gay streets. Beyond this is the principal retail district. Charles Street is the principal north and south thoroughfare. Charles and Baltimore streets divide the city into four sections, and the numbering of the streets begins at the point of their intersection, extending north, south, east and west. With few exceptions the numbers run 100 to the block, so that one can quickly and easily locate any point in the city.

Parks and Squares. Baltimore is celebrated for its many trees, parklike "Places," boulevards and shady squares. Druid Hill Park, containing nearly 700 acres, is the most noted. The park is laid out with walks and driveways, contains public athletic grounds and tennis courts, an artificial lake, a native forest, a botanical palace and an excellent zoological collection. Clifton Park, in the northeast section, has an area of 253 acres and an artificial lake. Other parks of note are Patterson, in the southeast section; Riverside, on the peninsula; and Carrol, in the southwest section.

Baltimore is known as the "Monumental City," and the name was derived from the Washington Monument in Mt. Vernon Place. The white marble shaft, 164 ft. high, is surmounted by a heroic statue of Washington. A stairway leads to the top, from which an excellent view of the city can be obtained. This monument, begun in 1815 and completed in 1829, was the first monument of note erected to Washington. In Monument Square, near the post office, is the battle monument, erected to the memory of those who fell in defense of the city in 1814. There is a monument to Edgar Allan Poe in the Westminster Presbyterian Churchyard, where he lies buried, and in Greenmount cemetery are the graves of Johns Hopkins, Sidney Lanier and John McDonogh.

Public Buildings. The business section has been practically rebuilt since 1904 and is characterized by modern structures of stone, steel and concrete, whose uniformity adds much to the beauty of this part of the city. The city hall, courthouse and post office each occupy a separate block along East Fayette Street in the center of the business district and almost in the exact center of the city. Other buildings of note are the Baltimore & Ohio and the Union railway stations, the new customhouse, the Stafford Hotel, the Baltimore & Ohio office building, Hotel Belvedere, Hotel Emerson, the new Y. M. C. A. Building and the Fifth Regiment Armory. Among the many churches the following deserve special mention: the Roman Catholic Cathedral, built of granite and in the form of a cross, the First Presbyterian Church, the Unitarian Church and the Mt. Vernon Methodist Church.

Institutions. Chief among the educational institutions stands Johns Hopkins University, which, with Johns Hopkins Hospital, has achieved international reputation (See Johns Hopkins University). Other educational institutions of prominence are the University of Maryland, the Goucher (Women's) College, the City College, the Polytechnic Institute, the Baltimore College of Dental Surgery, the Peabody Institute, the Maryland Academy of Sciences and the Walters Art Gallery. The libraries include the Enoch Pratt Free Library, which maintains branches in various parts of the city, the Bar Library, the Maryland Diocesan Library, the New Mercantile Library and a medical library. Among the charitable institutions are numerous hospitals, the Sheppard-Enoch

Pratt Hospital, Maryland Hospital for the Insane, several children's and orphans' asylums and a Pasteur institute.

Industries and Commerce. Baltimore is one of the leading industrial and commercial centers of the country. It is the foremost center in the world for canning oysters and fruits (See Oyster). The next industry of importance within the city limits is the manufacture of clothing. The city also leads in the manufacture of straw hats, cotton duck and fertilizer. Other important industries are the manufacture of leather, of tobacco and of pottery. The extensive steels mills and shipyards at Sparrow's Point and the car works at Curtis Bay cause the city to rank among the leading centers for the manufacture of iron and steel. The foreign commerce is extensive. The largest ocean steamers can enter the lower harbor, where they have docks at Locust Point and Canton. The German-Lloyd, Hamburg-American and other important trans-Atlantic lines have terminals here. Vessels of lighter draft enter the upper harbor, from whose docks an extensive coastwise trade is carried on. Its shipping facilities have made Baltimore an important railway center, and the Baltimore & Ohio, the Pennsylvania, the Western Maryland and other systems have here extensive warehouses and terminal facilities. The most modern appliances for transferring freight are employed and vessels and cars are quickly loaded and unloaded. The chief peculiarity of the local traffic is the city markets, in which produce of all sorts is found. The leading markets are those on Marsh Market Space and Lexington Market at Eutaw and Lexington streets.

History. The city was named for the lords Baltimore, who founded the Colony of Maryland. The town was founded in 1729 and incorporated in 1796. It was an important center during the Revolutionary War, and Congress sat here for a short time when the British held Philadelphia. During the War of 1812 the city was bombarded, but was successful in resisting the attack. It was during this bombardment that *The Star Spangled Banner* was written (See Hymns, National, subhead *The Star Spangled Banner*). In the year following, Baltimore was the center of many activities. In 1792 the first monument to Columbus in America was erected here. The first balloon ascension was made from here in 1784. The first telegraph message was received here in 1844 (See Telegraph), and in 1819 the Independent Order of Odd Fellows was organized here. During most of the time that the Civil War was in progress the city was under military rule. Since that period its record has been one of growth and prosperity, with the exception of the great fire in 1904, which laid waste 150 acres in the business district. This fire, however, was not wholly a calamity. Measures were at once taken for rebuilding the burnt district on the most modern plans, and the new district is not excelled for compactness and beauty by any city in the country. The growth of the city has been constant and conservative. Population in 1920, U. S. Census, 733,826.

Baltimore Oriole, *O' ri ole.* See Oriole, subhead *Baltimore Oriole.*

Baltimore, Sir George Calvert, Lord (about 1580-1632), an English statesman. On becoming a Roman Catholic (1624), he resigned as secretary of state to James I. The following year, however, he was made a peer. Having been a stockholder in the London Company and a councilor for the Plymouth, Baltimore was so absorbed in colonization that he had previously obtained the grant for a tract in Newfoundland, becoming its sole owner and governor. Because of its climate, he left the grant for one in Maryland. He died before this last charter was confirmed. The land was granted, however, to his oldest son, Cecilius, who founded the colony, aiming to make a refuge for believers in his faith.

Baluchistan, *Bal oo" chi stahn',* a semi-independent country in Asia, bounded on the n. by Afghanistan, on the e. by Sindh (British India), on the s. by the Arabian Sea and on the w. by Persia. Its area is

estimated at 134,000 sq. m., and it extends between 25° and 32° north latitude and between 61° and 70° 30′ east longitude. Large mountain ranges enter from the northeast, and the principal elevations of the rugged country are the Kirthar Range, the Suleiman Mountains and the Hala Mountains. There is a coast line of 600 m., without any good harbors, and the rivers are short and unimportant, except in so far as they can be used for irrigation purposes. The chief streams are the Bolan, Mula, Hingol and Purali. The climate ranges from excessive heat in the summer to severe cold in the winter. In the northwest is a level country, but the region of cultivable land is comparatively small. In the Province of Gundava the crops are principally Indian grains, while the date palm, indigo, cotton and numerous Southern fruits are cultivated in different parts of the country. Among the mineral deposits are gold, copper, silver, zinc, salts, iron and saltpeter. Aside from rough blankets, manufacturing products are practically unknown. Wool, tobacco, madder, hides and dry fruits are exported.

The inhabitants, the Baluchis, are of Aryan descent and are known as a nomadic people, physically above the average. They live a semi-independent life and are Mohammedans. Native chiefs, subject to the khan of Khelat, administer the government; the khan of Khelat in turn is advised by a British agent who represents the governor-general of India. There are two tribes, the Baluchis and the Brahuis, and the total population is estimated at 800,000.

Balzac, *Bal′zak,* **Honoré de** (1799-1850), a French novelist, born in Tours. He gave up law for literature at an early age, and in 1824 went to Paris, where he became a publisher, then a printer, but failed financially in both ventures. From 1830 until his death he devoted his best energies to writing, and produced in all over 80 novels. He was an indefatigable worker, the length of his ordinary workday varying from 12 to 20 hours. In March, 1850, when his health was failing rapidly, he married the Countess of Poland, Madame Hanska, who had influenced him to a great extent ever since his meeting with her in 1833.

Balzac grouped all of his novels into one structure, called *The Human Comedy,* in which it was his purpose to depict, through fiction, a natural history of civilized man. In scope and comprehension, in the knowledge of human nature that it reveals, in the vitality of its characters, his work ranks second only to Shakespeare's. As a realist, he has been accused of overfondness for depicting misfortune and vice, of seeing humanity as a whole too often "in black." His style, never beautiful, is frequently lacking in force, and incorrect; but no other novelist has equaled him in minuteness as well as elaborateness of observation or in wealth of imaginative power. His masterpieces are *Eugénie Grandet, Scenes of Provincial Life, Scenes of Parisian Life, Le Père Goriot, La Cousine Bette* and *Le Cousin Pons.*

Bamboo′, a tropical tree of the Grass Family, growing in extensive groves or, in smaller species, in the shade of other forest trees. It has the typical form of the grasses, a hollow stem with noticeable joints at which the hollow column is closed; the leaves have short stems and long, sheathlike blades; the flowers hang in clusters, but, unlike most grasses, have six stamens and three divisions of the leaflike scales, called lodicules, surrounding the stamens. Some species blossom annually, others only once in many years. The fruit of these different species also differs radically; in some being a grain, in others a nut and in still others being more like our apple. It is a tall tree, often growing to a height of 120 ft.

To the people of Malay, India, Ceylon and China, where the bamboo grows extensively, it is put to innumerable uses. The abundant seeds have often staved off a famine when the rice crop has failed. The young shoots are cooked and eaten like asparagus, or may be pickled or candied. The stems and branches have more uses. The native Indian with a long knife as his only tool can construct from bamboo his hut and

furniture in about an hour. In business, irrigating pipes, ropes, rafts, sails, measuring rods, spears, arrows and water wheels come from the same source. For the pleasure and convenience of the family the bamboo supplies material for lacquered stands, palanquins, musical instruments, canes, fans, parasols, pens, books, brushes, coarse baskets, dainty filigree work, pipes, hats, coats and playing cards.

The bamboo which has been made to grow in the United States is smaller and less useful. In the South its stems grow from 10 to 35 ft. in height; in the North seldom higher than 10 ft. It is cultivated chiefly for ornament, but in Arkansas the young shoots are used for forage, and the stems for fishing poles, canes, pipes and mats.

Banana, *Ba nan' a,* a name given to a treelike herb of the Banana Family. It is a tropical plant, grown mainly for its fruit, though some species are cultivated for their fiber and some for ornament. The rootstock, which is perennial, sends up a number of suckers which bear a circle of large, showy leaves at a height of from 8 to 40 ft. from the ground. After about two years of growth, peculiar, scaly, heart-shaped buds develop, and, as these mature, from underneath each scale a blossom appears which points upward. Sometimes one bud will produce over 100 flowers. The fruit, which always grows up, is familiar in this country through importation. It is gathered when green, and the stem upon which it grows is then either cut down or allowed to decay, as it never bears a second crop. Two or three of the many new suckers, which appear as soon as an old one is cut, are left to produce later crops.

The banana of commerce has only rudimentary seeds and is always propagated by means of suckers. Other species produce seeds. The bananas of the United States are imported chiefly from the West Indies and Central America, although they are raised in small quantities in California, Florida and Louisiana. Banana flour and dried bananas are also coming into use in the tropics and in the United States. The fruit itself is extremely nutritious and, being pleasing to the taste, is imported in large quantities.

Recently the Chinese have discovered a use for the hitherto wasted stalks. Their fibers have been found to be suitable for the manufacture of a durable cloth especially adapted to tropical wear. Plants one year old are selected; the stem is unrolled and steamed until soft. The green outer skin is then removed and the remaining fiber is pounded, cleaned and twisted into yarn. At present the price is high, being over one dollar per yard, but, as the demand grows and the industry becomes an assured one, the prices will, no doubt, be lowered on acount of the abundance of the raw material.

Bancroft, *Ban' kroft,* **George** (1800-1891), a distinguished American historian and statesman, born in Worcester, Mass. He was the son of a Unitarian clergyman. Bancroft was prepared for college at Exeter, N. H., graduated at Harvard in 1817 and in 1820 received the degree of Ph. D. at the University of Göttingen. He now decided to specialize in history, and studied at Berlin and Heidelberg. Among his acquaintances were Schleiermacher, Von Humboldt and Goethe. Returning to the United States in 1822, he soon took up literary work, publishing in 1834 the first volume of his *History of the United States.*

Bancroft was a zealous advocate of Democratic principles and ran on the Democratic ticket for governor of Massachusetts in 1844. As secretary of the navy under President Polk he brought about the establishment of the naval academy at Annapolis and instituted various reforms and improvements in connection with his department. While acting as secretary of war *pro tempore,* he gave the order which caused the United States to march troops into Texas. Bancroft ably represented his country as minister to Great Britain, to Russia and to Germany, and, while minister at Ber-

lin, rendered valuable service in the settlement with England of the northwestern boundary of the United States. He resigned his position in Berlin in 1874 and lived in Washington and Newport thereafter.

At various periods Bancroft worked on his *History,* the last revised edition of the whole work appearing in 1884-1885. He was correspondent of the Royal Academy of Berlin and of the French Institute, and received honorary degrees from Oxford and the University of Bonn. Besides his *History,* he wrote a long list of orations and political papers, and made various speeches and addresses. Bancroft's greatest work represents the most thorough and careful preparation and is characterized by scholarship, perfect sense of proportion, philosophic spirit and an interesting style.

Bancroft, Hubert Howe (1832-1918), an American historian, born at Granville, Ohio. He went to California in 1852 and engaged in the business of book publishing, in which he was very successful. Becoming greatly interested in the history of the Pacific coast, he collected a library of 60,000 volumes principally on American history and came into possession of the library of Maximilian, Emperor of Mexico. In studying and classifying his library Bancroft was led into original historical research, as a result of which he gave to the world in 1874-75 his noted work in five volumes, entitled *The Native Races of the Pacific States.* In 1882 the first volume of his *History of the Pacific States* appeared, to be completed in numerous volumes. He has written also on the vigilance committee and the Spanish missions.

Ban'dage, a surgical appliance, usually of some woven material, used in binding wounds or holding dressings and compresses in place. Sterilized gauze, a loose-woven cloth, which has been treated with antiseptics and so prevents, to a certain extent, the entrance of bacteria, is now purchasable at drug stores, and such bandages are safer than the home-manufactured ones. The bandages required for different surgical operations are as diverse as the method of treatment, and the knowledge of making them is almost a science by itself. Physicians, surgeons and nurses must be especially well prepared in the art of making bandages, and knowledge of anatomy is essential to properly placing them in cases of serious cuts or wounds.

Bandicoot, *Ban'di koot,* a name given to a number of small Marsupials found in Australia and classed in a family known as the Bandicoot Family. All of the bandicoots make small, round nests in a hollow of the ground, and in this the young are raised. They feed by night upon mice, bulbs and roots and sleep through the day. The bandicoots vary greatly in form, color and habit, some having piglike feet and others being more like the kangaroos. All are alike hated by the Australian farmers for their destructive habits in the cornfield and garden.

Bane'berry, a bushy plant of the Crowfoot, or Buttercup, Family, growing in woodlands from Maine to Pennsylvania and west. It has much-parted leaves, slender stems and clusters of tiny white flowers with narrow petals and many long stamens. The sepals fall when the flowers open. There are several species, one of which is well known for its fruit, a blue-white berry growing at right angles to the main stem. The individual stems and the flower stem are deep red, and each berry has a purplish-blue dot at its apex. This combination of color makes them very noticeable and gives credence to the tradition that a powerful witches' brew could be distilled from their juice. The baneberry blooms from April till June and the fruit ripens in September.

Banff, *Bamf,* a city of Canada in the Province of Alberta at the confluence of the Bow and the Spray rivers, on the Canadian Pacific Railway, 81 m. w. of Calgary. The town has a beautiful situation in the Valley of the Bow River among the mountains, and is the station for the Rocky Mountain Park of Canada. The city is surrounded on all sides by magnificent scenery, and is a noted

and popular summer resort. Besides the park, which covers 10,000 acres, there are many other places of important and scenic interest. Chief among these are a remarkable grotto covering a sulphur spring, called the Cave, an open-air sulphur spring, the Basin, or Pool, the picturesque Cascade River and several mountains towering near by. Among the important buildings are hotels and sanitariums. Population in 1911, 937.

Bangkok, *Ban"kok',* the capital of the Kingdom of Siam, situated on the Menam River, about 20 m. from its mouth. Formerly the houses were built on piles, with canals taking the place of streets, but within recent years the thoroughfares are well-constructed streets and the houses are modern. The principal buildings are the royal palace, public offices, the mint and several schools and churches. The trade is controlled chiefly by the Europeans and the Chinese, and the exports consist principally of rice and teak. Population, estimated at 650,000.

Ban'gor, Me., port of entry and county seat of Penobscot Co., 138 m. n.e. of Portland and 246 m. from Boston, on the right bank of the Penobscot River, at the mouth of the Kenduskeag, about 60 m. from the Atlantic Ocean, and on the Maine Central, the Bangor & Aroostook and other railroads. There are electric car lines radiating in all directions. Bangor has direct steamboat connection with Boston. A bridge about 1300 ft. long, crossing the Penobscot, connects the city with Brewer on the opposite side of the river. Large steamboats ascend the river to this place, where the tide rises 17 ft. There is an excellent harbor. The Kenduskeag River affords abundant water power, which is employed in numerous factories and mills.

Bangor is actively engaged in the coast trade, foreign commerce and shipbuilding, and is one of the greatest lumber markets in the North. Ice cutting is an important industry, Penobscot ice being exceptionally pure. The manufacturing plants include machine shops, furniture factories, agricultural-implement works, pulp, paper and woolen mills, manufactories of dairy products, boots, shoes, moccasins and trunks, flour mills and pork-packing establishments. There are also great woodworking plants, which produce the finest designs in interior decorations and architectural woodworking.

Bangor is a trade center for eight counties, and the value of both its imports and exports is large. The Bangor Theological Seminary (Congregational), which was founded in 1816, the Eastern Maine General Hospital and the Eastern Maine Insane Hospital are located here. Orono, nine miles away, is the seat of the University of Maine. The city is the home of many sportsmen and the rendezvous for huntsmen and fishermen.

The first permanent settlement was made in 1769 by Jacob Buswell, a "soldier and hunter, boat builder and cooper." The place was known as Kenduskeag until 1787, and as Sunbury from 1787 to 1791, when it was incorporated under the name of Bangor. In 1834 it was chartered as a city. Population in 1920, U. S. Census, 25,978.

Bangs, John Kendrick (1862-), an American author, born in Yonkers, N. Y. He graduated at Columbia, studied law and became editor of various periodicals, among others, *Harper's Weekly* and *Harper's Magazine.* Humor, lightness of touch and human as well as dramatic appeal are characteristics of his writings. Best known are his *Tiddledywinks Tales, The Idiot, Mr. Bonaparte of Corsica, Three Weeks in Politics, The Bicyclers, A Houseboat on the Styx, Ghosts I Have Met, Mollie and the Unwise Man, The Real Thing* and *Songs of Cheer.*

Ban'jo, a musical instrument, with a body shaped like a tambourine and a long neck like a guitar. It has five to nine strings and is played like the guitar, by striking or twitching the strings with the fingers of the right hand and stopping them with the fingers of the left.

Bank Bill. See MONEY, subhead *Paper Money.*

Bank of North America. See BANKS AND BANKING, subhead *History of Banking in the United States.*

Bank of the United States. See BANKS AND BANKING, subhead *The Bank of the United States.*

Bank'rupt Law, a law for freeing an insolvent person from debt. The law of bankruptcy is a modern creation. It has grown slowly in response to the needs of the time, and is a development from the criminal law. When an individual is unable to pay his debts, it provides a means by which the claims of his creditors may be met proportionately out of such assets as he controls. Having been declared a bankrupt, the individual starts anew, relieved from legal, if not from moral, obligations for the debts previously contracted.

Banks and Banking (from Italian *banco,* German *bank,* a bench or table for exchanging money), terms used to designate certain financial institutions and their operations. Banks perform three main functions: they are depositories of money, they loan money and they issue circulating notes. The first two functions are performed by practically all banks; the last, only by banks especially authorized by law so to do, and known as banks of issue.

FUNCTIONS. These functions require consideration in further detail. As a *depository of funds,* the bank has become an indispensable factor in modern business. In this capacity it serves as the custodian of funds, relieving the business man of the danger of loss incident to keeping his money at his own place of business. But more than this, it greatly facilitates the payment of bills and the conduct of transactions. The depositor can draw a check against his account in the bank for the exact amount which he wishes to pay, and send it by mail to the man who has a claim to be settled. These checks do not even have to be presented by the payee at the bank on which they are drawn, but become negotiable upon indorsement, and may be deposited at any bank, finally reaching their destination through the clearing house (See CLEARING HOUSE). Checks thus serve as money, or as its substitute (See CREDIT; MONEY, subhead *Credit Money*).

The loaning of funds is another important function of the bank. For this purpose not only is the capital available, but likewise the amounts received on deposit, less the legal reserve which must be kept on hand. Banks thus gather up idle money and utilize it in the profitable activities of the community. These loans are secured by the credit of the borrowers, by personal indorsements or by collateral notes, bills or bonds. In state banks, but not in national, money is also loaned on real estate mortgages. The interest on bank loans, usually paid in advance and known as discount, constitutes the bank's chief source of profit. Bank loans are commonly made for short periods of time and for commercial purposes, leaving the long-time loans to be negotiated by other agencies.

Banks also help to provide a currency by *issuing circulating notes.* Formerly this function was performed by practically all banks, but now the privilege is limited in most countries to specified banks which guarantee their circulation by depositing approved securities with the government or by maintaining an adequate gold and silver reserve, in which coin they agree to redeem their notes on demand. In the United States the issuing of circulatory notes is practically limited to national banks. By depositing government bonds (in which all national banks must invest a part of their capital) with the Federal Treasury, these banks may issue circulating notes to the extent of the par value of the bonds, provided this does not exceed the capital stock of the bank. There is a tax of one-half of one per cent on this national bank circulation; but as the tax on state bank circulation is ten per cent, the latter banks have been forced out of this branch of the business.

The bank also serves, incidentally, as a *collection agency,* in several different ways. It receives from its customers drafts and bills of exchange for collection, and sends them to its bank corre-

BANKS AND BANKING

spondents in the cities where the parties live against whom they are drawn, crediting the owners with the proceeds. It likewise receives from its bank correspondents in other cities bills drawn against parties in its own city, presents these for collection and remits the proceeds. In the course of the day's business, there are also deposited in the bank many checks and drafts drawn on other banks, both in the home city and in other cities. These the bank accepts as cash and sends to its corresponding banks for collection.

KINDS OF BANKS IN THE UNITED STATES. Under the subhead *History of Banking in the United States* in this article will be found some account of the development of banking in this country. Under the present heading the various kinds of banks are described, without reference to their historical origin and relations. There are six kinds of banks in the United States — national banks, state banks, loan and trust companies or trust companies, saving banks, private banks and postal savings banks.

National Banks are organized under charters secured from the Federal Government. The capital stock must be not less than $50,000, except in towns of 3000 population or less, where it may be $25,000. At least 25 per cent of the capital stock must be invested in United States Government bonds, unless this percentage exceeds $50,000, which is the maximum investment required. National banks must make five reports each year to the comptroller of the currency at such times as they may be called for, and are subject to inspection by national bank examiners. They must keep reserves on hand to the extent of 15 per cent of their deposits and outstanding notes, but three-fifths of this reserve may be redeposited with national banks in certain specified large cities, known as reserve cities. In the latter, the national banks must maintain a reserve of 25 per cent, but may redeposit one-half of this with other national banks in New York, Chicago or St. Louis. The stockholders of national banks are legally liable to the amount of their stock. A national bank is not permitted to make loans upon real estate security, nor to own real estate, other than its bank building, unless taken in payment of debts.

State Banks are organized under charters secured from the respective states in which they are located, and are subject to state jurisdiction. In practice they do not issue circulating notes, because of the prohibitive tax. They may loan money on real estate security as well as upon other forms of collateral and upon commercial paper. The laws relating to state banks are reasonably uniform throughout the United States, and these institutions are generally conducted on a sound financial basis.

Loan and Trust Companies, or *Trust Companies,* are also under state supervision. In general their loans are made upon collateral securities rather than upon commercial paper. They usually pay interest on deposits. While they often do a general banking business, their operations to a considerable extent consist in handling estates and trust funds, often of large amount.

Savings Banks were originally organized as benevolent institutions, established in order that the thrifty man of limited income might have an opportunity to make investments in small amounts from time to time. They are of comparatively recent origin, dating from the latter part of the 18th century. The first one established in the United States was the Philadelphia Saving Fund Society, chartered in 1819. Others were soon established in New England, and then they spread rapidly to other parts of the United States. They are under the control of state laws, which are fairly uniform in the various states and are designed to safeguard the depositors in every possible way. Their development and influence have been remarkable. In 1917 the $5,418,022,275 deposited in savings banks in the United States was owned by 11,148,392 depositors, with an average account of $477 each. The average rate of interest paid by savings banks is about three and one-half per cent.

Private Banks are established by individuals and companies for the purpose of loaning money and receiving deposits. There is little state regulation and their reliability depends upon their capital, their honor and the conservatism with which their business may be conducted.

Postal Savings Banks paying two per cent interest have been established under the auspices and guaranty of the Post Office Department of the United States Government, to encourage thrift by providing a safe place of deposit for small savings. See POSTAL SAVINGS BANK.

The Banking power of the United States in June, 1918, is given as $39,082,800,000. The banking power of the United States alone is nearly two and a half times as great as the banking power of the world in 1890, when estimates placed it at $15,985,000,000, and the banking power of the United States is now more than seven times greater than in 1890, when it was estimated as $5,150,000,000.

BANK OF ENGLAND. The Bank of England, the most important bank established in the world, was chartered in 1694 as a joint-stock association, with a capital of £1,200,000, all of which it loaned to the government. In return it was made the banking agency of the government, with the right to issue notes and establish branch banks. Its charter has been renewed and amended from time to time, the last renewal being in 1844, when the issue department of the bank was separated from the general banking department. The notes issued by the Bank of England are in denominations of £5 and upward, and are based on bullion and approved securities, most of the latter being government bonds. The bills are convertible at any time into gold. The bank has the management of the public debt and aids in financing the government. For 160 years it has occupied its great one-story stone building in Threadneedle Street, which covers about three and one-half acres. In addition to the Bank of England there are also many private and joint-stock banks in England. These do a general banking business, but their right of issue has been so restricted as to leave that function almost wholly to the Bank of England.

CONTINENTAL BANKS. On the Continent of Europe there are both governmental and private banks. *The Bank of France* is a private corporation, second only to the Bank of England in reputation. It was founded in 1800 and has the sole right to issue bank notes in France. It is the regulator of the commercial credit of France, has often rendered service to the government by loans, and at times has given outside assistance, as during the embarrassment of the London money market in 1890. Its holdings of gold exceed those of any other institution in the world except the United States Treasury. There are also large and important banks in the other countries of Europe.

EARLY HISTORY OF BANKING. Banking has been in existence since remote antiquity, but with this difference: the modern banker deals in credit, while the banker in ancient times was primarily a custodian of other people's money and a buyer and seller of foreign moneys. Evidences have been discovered of the existence of banks in Assyria several thousand years before Christ. In ancient Athens and Rome, also, banking operations were conducted. Modern banking, however, had a somewhat independent origin in Italy in the Middle Ages, the earliest public bank, that of Venice, being established in 1171. But this was at first a bank of deposit only, and it was still several centuries before the introduction of banking in the modern sense, involving the loaning of money left on deposit, the issuing of bills as currency, and the use of transferable checks. Public banking in this sense began with the establishment of the Banco di Rialto at Venice in 1587. The bank note was invented and first issued by the Bank of Sweden in 1661. It was not until the 18th century that banks took the further step of issuing notes not secured by coin, and of loaning money on the credit of the borrower.

HISTORY OF BANKING IN THE UNITED

STATES. At the birth of the United States as a nation, one of the most serious problems was that of financing the war and meeting the expenses of government. A new financial system had to be created in the midst of the struggle for independence. The first attempt was made by issuing paper currency known as continental money (See CONTINENTAL MONEY). The collapse of this currency led to the chartering by Congress of the Bank of North America in 1781, which was expected to supply an adequate circulating medium for the country by its issue of notes. Through this bank Robert Morris loaned large sums of money to the government and did much to restore credit. The Bank of New York and the Bank of Massachusetts (at Boston) were organized in 1784. The different states continued to issue paper money until 1789, when this was prohibited by the new Constitution. But during the subsequent period the states still chartered banks that issued currency; the circulation of which, however, was largely local and often depreciated below face value.

The Bank of the United States. On Feb. 25, 1791, Congress chartered the Bank of the United States, as an essential part of the financial system inaugurated by Alexander Hamilton, the first secretary of the treasury. This is sometimes called the *Central Bank*. It had a capital of $10,000,000, one-fifth of which was subscribed by the government. In addition to doing a general banking business, the bank furnished a sound circulating currency, aided in financing the government and was the depository of the national treasury. It was located at Philadelphia, but established branches in other cities through which it facilitated exchange between the different parts of the country. Its charter was limited to 20 years. When this expired, so much opposition had developed to a centralized bank, especially on the part of the state and private banks, that a renewal was denied by Congress. The institution wound up its affairs, and was converted into a state bank.

BANKS AND BANKING

The war with England brought about a suspension of specie payments by the state banks in 1814, and so demoralized the currency that Congress was glad to recharter the Bank of the United States in 1816, with a capital of $35,000,000. Of this, the government again subscribed one-fifth, and made the bank, with its branches, the depository of the public funds. The state banks were forced to resume specie payments, and business again prospered. When the charter expired in 1836, it was not renewed, largely because of the opposition of President Jackson, and the bank was forced to go out of business in 1841, with the loss of its entire capital, although it succeeded in paying all of its debts. Under President Van Buren the United States treasury and subtreasury system was established for the care of the national funds (See TREASURY DEPARTMENT), and the state banks were given full swing for a quarter of a century.

State Banks. State banks are banks that are chartered by the Legislatures in the several states. They existed from the first as strong rivals of the Bank of the United States; and between the first and second charters of that bank, 1811-1816, they greatly increased in number and importance. They have also existed side by side with the national banks since 1864. During the period from 1836 to 1864, however, they constituted the distinctive feature of the nation's financial history. These banks were without Federal supervision, and the banking laws differed greatly in the various states. As a result, the currency fluctuated in value, and it was dangerous to accept a bank note without first investigating the bank. The panics of 1837 and 1857 were caused by wild speculation, which was directly encouraged, to say the least, by over-issues of unsecured bank notes.

In response to the public demand for greater security, New England adopted a system known as the "Suffolk System," which required the prompt redemption of the banks' notes at par, by means of deposits kept for that purpose with the Suffolk Bank in Boston. New York

State in 1829 devised the "safety fund system," which required the cooperating banks to pay dues into a common fund for the assistance of any contributing bank in case of need; but this fund was exhausted in the panics of 1837 and 1857. In 1838 New York adopted the "free banking system," which required banks to secure their issues of currency by means of various classes of public bonds to be deposited with the banking department of the state. This plan was imitated in several other states, and formed the basis of the later national bank system. The formation of clearing houses, beginning in New York in 1853, further aided in securing stability. Many of the state banks were converted into national banks in 1864 and the rest continued to transact a general deposit and loan business.

National Banks. The vast expenditures of the Civil War forced the government to adopt a new financial system. The state banks had suspended specie payments in 1861, and there was no central bank through which the government could borrow funds. In this crisis Salmon P. Chase, secretary of the treasury, devised the national bank system as a means for securing Federal loans by granting special privileges to banks that would advance the money. This was accomplished by the national bank law of Feb. 25, 1863, supplemented by that of June 3, 1864. Any national bank might be organized under a Federal charter, with a capital of not less than $50,000, provided it invested at least one-third of its capital in United States bonds. Large numbers of national banks were at once organized, and by the new system the government secured both a market for its bonds and a uniform national bank currency, guaranteed by these bonds, to supplant the old local state bank currency which had become wholly inadequate to meet the needs of the commercial world. In later Congressional acts, notably the Gold Standard Act of 1900, the provisions of the national bank law were modified in the direction of greater liberality.

BANKS AND BANKING

Regional Reserve Banks. On Dec. 23, 1913, the act providing for regional reserve banks became a law. This act created a Federal Reserve Board consisting of the secretary of the treasury, comptroller of the currency, and five other members appointed by the president. An organization committee consisting of the secretary of the treasury, the secretary of agriculture and the comptroller of the currency was also provided. This committee divided the country into 12 districts and located the regional banks at New York, Chicago, Minneapolis, St. Louis, Kansas City, Cleveland, Dallas, San Francisco, Boston, Philadelphia, Atlanta and Richmond, Va. All national banks are required to become members of the regional bank in the district by subscribing for stock in the regional bank. State banks may become members by complying with the same requirements as the national banks. Regional banks deal only with member banks except in special cases. Funds deposited in regional banks may be loaned to member banks on such commercial paper as is approved under the law.

The government is authorized to issue new treasury notes of a distinctive style for each regional reserve bank. When such a bank is under the necessity of paying out more money than its cash resources permit, it can place a portion of its commercial paper purchased from member banks in the hands of the Federal reserve agent and receive therefor its new currency. Each reserve bank, however, is required to keep a reserve of 35 per cent of its deposits and a 40 per cent gold reserve as a guarantee of the redemption of this currency. Its redemption is also guaranteed by the government. One regional bank cannot pay out the notes of another except under penalty of a heavy tax. These special notes are to be retired as soon as the emergency calling for their issue has passed.

The Federal Reserve Board exercises general control over the entire system, and can compel one regional bank to loan to another in time of need.

Banks, Nathaniel Prentiss (1816-1894), an American soldier and statesman, born at Waltham, Mass. He became editor of a local paper, studied law and was admitted to the bar, and was elected to the State Legislature in 1849, and to Congress in 1853, becoming speaker of the House. He was made governor of his state in 1857. When the Civil War broke out he was commissioned major-general of volunteers and was assigned to a command in the Army of the Potomac. He led the expedition against New Orleans in 1862, where, upon his arrival, he succeeded General Butler in command of the Department of the Gulf. In 1863 he opened the Mississippi by capturing Port Hudson and 6000 prisoners. He undertook the Red River expedition in 1864 against his will, but was forced to retreat, and soon after was relieved of his command. He was elected to Congress and served from 1864 to 1877, except from 1872 to 1874, and was again elected in 1888. He was for a long time chairman of the committee on foreign relations in the House.

Bannockburn, *Ban' uk burn,* a small village in Scotland, where a celebrated battle was fought in 1314, when the Scots under Robert Bruce gained a signal victory over the English under Edward II. This battle assured Scotland's independence. The English lost 30,000, while over 8000 Scotchmen fell upon the field.

Ban'yan, a large East Indian tree of the Fig Family. The seed is carried by birds to the branches of other trees, where it grows first as an air plant. Long roots are sent down to the ground, and as soon as they become firmly fastened in the soil they enlarge into stout, columnar trunks, or, more technically, supporting roots; meanwhile the branches thicken and divide until the original tree is completely overwhelmed and finally dies. The grove formed from one of these many-trunked trees often covers several acres and is capable of sheltering thousands of people. The banyan is found only in tropical forests. The leaves are large and leathery and the flowers, like those of the common fig, are so hidden within a fleshy receptacle that they are hardly known to exist. The fruits are about the size and color of a cherry and are produced in pairs. The tree grows to a height of 70 to 100 ft. and is known in India by a variety of names.

Baobab, *Ba' o bab,* or **Monkey Bread Tree,** an African tree of the Mallow Family, now, through transportation, also found in India. It is an immense tree, with thick but short trunk and spreading branches. The leaves, which do not appear in the dry season, are large and palmlike. Like most trees the baobab bears inconspicuous flowers, which are followed by an oblong, woody fruit known as monkey bread. This contains numerous seeds about the size of peas, closely packed in an acid pulp which has a pleasant taste and is prized by the natives. The baobab is sometimes wrongly called calabash.

Bap'tism, a religious rite or ordinance of New Testament times. It consists of the application of water, by sprinkling, pouring or dipping, accompanied by the words which Christ directed his disciples to use (See *Matt. xxviii, 19*). The Jews before the time of Christ administered a rite, similar to baptism, to converts when admitted to the Church, but the baptism administered by John the Baptist had an entirely new element and significance and must be regarded as the beginning of the Christian rite. John preached the necessity of repentance and remission of sins, and baptism as administered by him was a symbol of purification of sin. Christ submitted himself to this rite and, though he never baptized, he directed his disciples to administer baptism. Hence, baptism has become a religious ceremony among Christians and takes rank as a sacrament in such creeds as acknowledge sacraments. In the early days of the Church the person baptized was dipped in a river or vessel, that is, immersed. The Roman Catholic Church and most Protestant sects allow sprinkling or pouring, but those Protestants known as Baptists administer the rite only by im-

mersion. Different churches have adopted various customs in connection with the rite.

Bap'tists, the members of a group of Protestant Churches, whose distinguishing tenet is that immersion is the true form of baptism. The name was first applied in 1644 to certain congregations of English Separatists, the first in modern times to insist on immersion. The earliest church of this denomination in the United States was founded at Providence, R. I., in 1639, by Roger Williams. The great immigration movement westward, after the Revolution, was seized by the Baptists as an opportunity for their Church, missionary preachers were sent to the new settlements and local societies were formed for the extension of the work. In 1832 a national organization was formed, the American Baptist Home Mission Society, now supporting over 1500 workers. The American Baptist Publication Society has, since 1840, been the great denominational publishing agency. Several divisions occurred in the Church during the 19th century, but the Baptists have greatly increased in numbers and have a leading place among the churches in educational work. In 1919 the total number of Baptists in the United States, including all branches, was considerably over seven million.

Bap'tist Young People's Union, a federation of all young people of the Baptist Church in America, organized in 1891. Its purpose is to develop Christian character, to secure a union of effort among those interested in Christian work, to increase a knowledge of the Scriptures and to widen the interest in missions. The headquarters are at Chicago and there are branch societies all over the United States.

Barbadoes, *Bar ba' doze,* the most easterly of the West India Islands and one of the Windward Group. It is 21 m. long and has an area of 166 sq. m. The surface is hilly, and the highest point is Mt. Hillaby (1104 ft.). The soil is fertile, and practically the entire island is under cultivation. The chief exports are rum, sugar, arrowroot and an infusorial earth, extensively used as a polishing powder. Bridgetown is the capital. The island is a British possession. Population, about 195,000.

Bar"baros'sa. See FREDERICK BARBAROSSA.

Bar'bary States, Wars with. From the Middle Ages the Mohammedans of northern Africa had preyed extensively upon the shipping of Christian powers. In 1785 they began to interfere with the Americans, whereupon the United States followed the example of the European countries and arranged treaties with Morocco (1786-87), Algiers (1795), Tripoli (1796) and Tunis (1799). For a money consideration American shipping was to be free from attack. This arrangement continued until 1801, when the demands of the ruler of Tripoli became so excessive that President Jefferson decided to do away with the practice. Commodore Dale was sent to the Mediterranean with a squadron, and by capturing a large cruiser subdued Tripoli for a time. In 1802 Morris led a squadron and in 1803 Preble was sent to take command, war with Tripoli being now recognized by Congress. Many Tripolitan ports were bombarded and several captures were made of piratical cruisers. Finally, June 4, 1805, the Tripolitan bashaw concluded a treaty of peace, the United States agreeing to pay a $60,000 ransom for the officers and crew of the *Philadelphia.*

Despite the treaty of 1795, according to which the United States had paid a million-dollar ransom to the dey of Algiers and given promise of an annual payment of tribute, the Barbary vessels renewed their attacks with the abandonment of the embargo policy, and in 1812 Algiers declared war against the United States. The dey aided the British between 1812 and 1815; but when the War of 1812 with England was concluded, Congress declared war on Algiers, and in 1815 sent Decatur, with a squadron of ten ships, against the Algerians. By the time he reached Africa, the dey was prepared to sign a treaty of indemnity Sept. 5, 1815, renouncing claim to trib-

ute and promising to reduce no more captives to slavery. Later, Tunis and Tripoli agreed to similar renunciations. The United States was the first to check the depredations of these African corsairs, but the maritime countries of Europe soon followed her lead.

Bar'berry, or **Berberry,** an ornamental shrub of the Barberry Family, several species of which are familiar throughout northern United States. It is commonly found growing wild in lanes or along the borders of meadows and is among the most popular hedge shrubs. The leaves of the wild species are oblong with saw-toothed edges and spiny tips; they are generally thickly borne and proceed in clusters from the base of a three-branched thorn. The flowers hang in graceful, nodding sprays but are individually rather small and inconspicuous. They are yellow, red or orange in color and are often green-tinged. There is a curious little arrangement of the stamens in this flower, which it is interesting to notice. The corolla, by means of little folds, so encloses the stamens that they are released only by the touch of the wind, an insect or a person's hand. This is the way the barberry protects itself from fertilizing its own flowers (See CROSS-FERTILIZATION).

The fruit is an oblong, red or black berry, very sour, but used in making or flavoring jellies. The root produces a yellow dye used in coloring wool. The hedge barberries have broad-topped leaves of varying shades of green; many species are cultivated in America, but, as they form host plants for one stage of a harmful wheat rust, they should not be planted in wheat-growing countries.

Bar'ber's Itch, a skin disease which affects the bearded part of men's faces. It is caused by a parasite which enters the hair follicle and then spreads over the face. The infection is frequently carried on barber's implements. It is sometimes called barber's ringworm, and takes the form of scales or sporules, which have the appearance of whitish powder. It can be cured by careful cleansing with water and antiseptics and by applications of any drug such as nitrate of mercury, which destroys the life of the germ.

Bar'berton, Ohio, a city of Summit Co., 7 m. s.w. of Akron and 39 m. from Cleveland, on the Erie, the Pennsylvania and the Baltimore & Ohio railroads. It is attractively situated and is a progressive manufacturing center, having extensive manufactories of sewer pipe, rubber, paint, salt, strawboard, chemicals, pottery and match machinery. The Diamond Match Company has its large plant here. Barberton was settled in 1815 and was originally known as New Portage. It was incorporated in 1892. Population in 1920, 18,811.

Barcelona, *Bar"se lo' na,* one of the largest cities of Spain, formerly the capital of Catalonia, now the capital of the Province of Barcelona, situated on the Spanish Mediterranean coast. It is divided into two parts: the old town, with buildings of brick in Oriental architecture, and the new town, laid out symmetrically and built in modern English style. The city has several important educational institutions, and among prominent buildings are those of the university, several hospitals, a Gothic hall, the custom-house and the exchange. One of its theaters is as large as any in Europe; there are also public libraries, a museum, a cannon foundry and an arsenal. Barcelona is the commercial center of eastern Spain, and exports cereals, wines, olive oil, leather goods, furniture and machinery. Its imports include foreign manufactured goods, raw materials and combustibles. It has been the scene of many revolutionary riots; strikes due to political and economic causes are frequent. In 1640 the city, with the whole of Catalonia, submitted to French rule, but returned to its allegiance to the Spanish Government in 1652. It was captured by the French in 1697, but was restored to Spain the same year. Population, about 621,000.

Bard, a term applied to the ancient poets of the Celtic tribes. It was their work to compose and sing heroic and religious verse to the music of the harp, giving poetic expression to the patriotic and religious sentiments of the people. The bards of Wales and Ireland are best known to us. The first Welsh bards of whom we have authentic record lived in the sixth century. Edward I is said to have attempted the destruction of the bards of Wales by a general massacre, on the ground that they stirred up sedition by keeping alive the ancient spirit of the people. In 1818 the Cambrian Society was formed for the revival of the literature of the Welsh bards. The sonnets of the Irish bards are interesting as the source of the ancient history of Ireland.

Bareilly, *Ba ra' ly,* a city of northern India near the eastern boundary of the United Provinces. It is the capital of its district and is a growing commercial city. There are manufactories of furniture and of textiles. During a native uprising the European residents were at one time massacred by the native troops, but the city was retaken by Lord Clyde in 1858. It is now the seat of an English college and of important Persian and Hindu schools. Population, 130,000.

Barium, *Ba' ri um,* an element not found free in nature and not until recently obtained chemically. It is a bright yellow metal which oxidizes in air and has such an affinity for oxygen that it decomposes water vigorously, setting free the hydrogen. Barium compounds found in nature are heavy spar, or barium sulphate, and witherite, or barium carbonate. The name barium means heavy, and was given because all of its compounds have high specific gravity. Barium nitrate is used in the production of the "green fire" of fireworks, and barium sulphate, which when obtained artificially is a soft, white powder, is used in making a white paint.

Baryta, or barium monoxide, which is obtained from either heavy spar or witherite, is a white, poisonous powder used in refining sugar. Added to molasses or sugar solutions, it forms an insoluble compound. See PHOSPHORESCENCE.

Bark, the outer coating of the stems and branches of all plants which grow from within outward and are, by botanists, termed exogens. These exogens may be trees, shrubs or herbs, and in all, the structure of the bark is the same, although the external characteristics may differ. The bark is always separated from the central column of the stem by a gummy layer which seems to afford no connection between the two; there are, however, many tiny cells in this tissue which are capable of carrying nourishment from one to the other. The true bark of a typical exogen consists of at least three layers and sometimes four. Next to the wood, or outside of the gummy layer, lies first the fibrous bark, which is made up of long, woody cells; these are the cells which in hemp, nettles, etc., form the fibers. Outside of this is the green bark, a soft layer which contains the same green coloring matter, chlorophyll, as the leaves, and performs the same office, that of converting the carbon dioxide from the air into starch. Still farther outside lies the corky layer, which gives the color to the tree. If this layer is thin the bark of the tree will be smooth as in the beech, but if the cork is produced rapidly the tree trunk will be scaly and rough. The exterior portion of this layer is called the epidermis, and is made of thick-sided, empty cells. In herbs the corky layer is made up of the epidermis only.

The inner, or fibrous, layer is the only layer which grows after the first season. The green layer is made up of living cells but after a year of growth does not increase in size. The corky layer may grow for a short time but soon dies; as the inner wood and fibrous bark increase the outer must stretch in order to encircle it, and, if not elastic, cracks and falls away or remains on the tree in rough ridges. In the cork oak these dead sections are thrown off rapidly and form the commercial cork from which stoppers for bottles, life preservers, etc., are made. See CORK.

The color of the bark is due to different chemical factors, generally tannin, which is a fine preservative and protects the tree from destructive agencies. It is this principle which is extracted from the bark to be used in tanning leather (See LEATHER). From other barks are produced: drugs, such as quinine and Peruvian bark from the cinchona tree; rope from the hemp; medicines from the birch and other trees; and many other important commercial products.

Bar'ley, one of the important grains and a member of the Grass Family. It resembles wheat in form and manner of growth and is raised in practically the same localities, but is not so important. Its chief use is in the production of malt liquors, but barley meal and pearled barley are also made from it.

Barley requires fertile, well-drained soil, and fields in which it is to be grown should be deeply plowed but not treated with nitrogenous fertilizers. It is suggested that a field to be sown with barley should first be planted to corn, and the fertilizer, any well-rotted manure, may be applied to the field for this crop. In 1919 the barley crop of the world was 1,522,732,000 bushels. California, Minnesota, Wisconsin and Iowa are the chief barley-producing states. Barley is used in preparing medicinal drinks, soups, etc., but its meal is not valued for breadmaking. *Scotch barley* is the husked grain. *Pearled barley* is Scotch barley rounded in form and polished; it also is used for soups. See BREWING, subhead *Malting*.

Bar'low, Joel (1754-1812), an American poet, born in Redding, Conn. He was one of the group of authors at Hartford, popularly known as the "Hartford Wits." He spent several years abroad and died in a small village of Poland, while en route for Paris, where as American plenipotentiary to France, he was going to meet Napoleon and negotiate for a commercial treaty. His writings include the epic *The Columbiad;* a comic poem, *Hasty Pudding;* and *Conspiracy of Kings.*

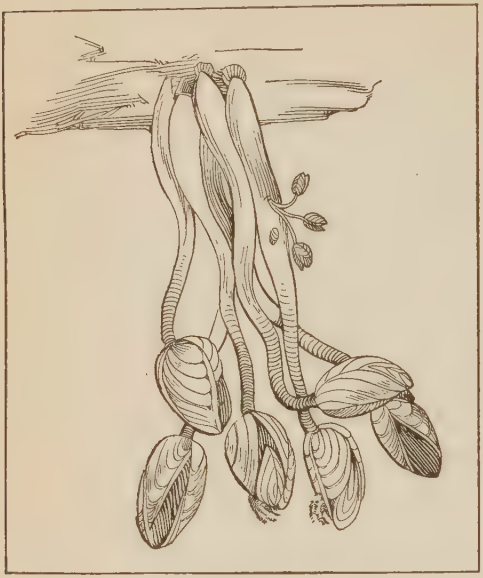
Bar'men, a city of Rhenish Prussia, situated on the Wupper River, 25 m. n.e. of Cologne. It is divided into Upper, Middle and Lower Barmen, and the district embraces also the numerous small villages along the valley. The Wupper, flowing through the center of Barmen, is spanned by 20 bridges. Among the prominent buildings are the Municipal Theater, the old and new Rathaus, the municipal hospital and several educational institutions. The manufactures are important, and it is the center of the ribbon industry of the country. Textiles, soap, candles, metalware, machinery, buttons and organs are manufactured. In Lower Barmen are a mineral spring and a bathing establishment. The bleaching industry (important since the 15th century) and the Turkey-red dye works give occupation to a large per cent of the inhabitants of the valley. In 1815 Barmen was annexed to Prussia. Population, about 156,000.

Bar'nabas (son of prophecy or of consolation), the surname given to a Levite named Joses (or Joseph), by the apostles. He was a fellow worker with Paul and, with him, was recognized as a leader in evangelistic work among the heathen. Barnabas is said to have suffered martyrdom on his native Island of Cyprus, a tradition of unreliable authority.

Barnacle, *Bar' na k'l,* a number of families of Crustaceans, representatives of which are found upon all seacoasts. The two best-known families are the acorn barnacles and the stalked barnacles. The acorn barnacles are those commonly seen upon rocks, submerged piles and ships, sometimes gathering so closely upon the latter as to impede their progress. Acorn barnacles pass through several larval stages, but, when mature, have acornlike shells, formed of living, lime-bearing tissue, within which they can completely withdraw, or from which they may protrude their limbs when seeking food. The shells are often tiny, but may become an inch or more across.

The stalked barnacle hangs from rocks by means of a long, fleshy stalk, near the

extremity of which is a jointed shell. This family is frequently known as the goose barnacle, because it was once believed that the so-called barnacle goose was hatched from the stalked shell.



STALKED BARNACLES

Barnacle Goose, a bird of the Duck Family. The barnacle goose is about the size of the domestic duck and may be known by its grayish and black-barred back, whitish under parts, and black crown, neck and chest. The name barnacle goose was given as early as the 11th century, when it was thought that barnacles (called goose barnacles) developed into geese (See BARNACLE). The barnacle goose lives in Greenland, Iceland and northern Europe. Its nesting habits are like those of the Canada goose.

Barn'ard, Frederick Augustus Porter (1809-1889), an American educator, born in Massachusetts and educated at Yale, where he graduated in 1828 and afterwards served as an instructor. He was a professor in the University of Alabama from 1837 to 1854, and, during the next seven years, in the University of Mississippi, which he also served as president and as chancellor. For 24 years, beginning in 1864, he was president of Columbia College (now Columbia University), New York. At his death he left most of his property to Columbia; and Barnard College, affiliated with this university, was named for him. Between 1860 and 1864 he was associated with numerous astronomical projects, and with the United States Coast Survey, the publications of which he had supervision. In 1867 he was United States commissioner to the Paris Exposition. He was the author of numerous publications, mostly of technical character.

Barnard, George Grey (1863-), a distinguished American sculptor, born at Bellefonte, Pa. He studied at the Chicago Art Institute and 12 years in Paris, the first three in the School of Fine Arts and the following nine in his own studio. His work brought him a notable European reputation and distinguished honors. In 1896 he removed to New York City, and is at the present time critic of sculpture in the Art Students' League and an associate of the National Academy of Design of that city. He was awarded gold medals at the Paris and Pan-American expositions. The work of Barnard is characterized by the highest idealism, originality of conception and fine technique. Admirable examples are *The Two Natures* and *The Boy,* Metropolitan Museum of Art, New York; *The Hewers; Maidenhood,* a chaste and beautiful work in marble; *The God Pan,* a bronze in Central Park, New York; a large fountain at Cairo, Ill., and another at Tampa, Fla.; a memorial of Governor Curtin, Bellefonte, Pa.; and the sculptural decorations of the Pennsylvania State Capitol.

Barnard, Henry (1811-1900), an American educator, born at Hartford, Conn., and a graduate of Yale in 1830. Admitted to the Connecticut bar in 1835, he served, 1837-1840, in the Legislature of that state, and in 1838 secured legislation establishing a state board of commissioners for "the better supervision of the common schools." Between 1838 and 1842, as secretary of that board, he made a national reputation as an educational

reformer. Rhode Island sought his services in 1843, and his work there resulted in the reorganization of their school system. He was the first commissioner of public schools in Rhode Island, 1843-1849; superintendent of common schools in Connecticut, 1850-1854; and principal of the Connecticut State Normal School at New Britain. He was, 1858-1861, the second chancellor (president) of the University of Wisconsin and agent of the board of regents of the normal school fund. Here he contributed largely to the organization of the public school system of Wisconsin. As the first United States commissioner of education, 1867-1870, he laid a secure foundation for the subsequent usefulness of the bureau of education. But his chief service was as the editor, 1855-1881, of the *American Journal of Education,* which is a veritable encyclopedia of education. Among the educators of America, Barnard must always rank high.

Barn'burn"ers, in American history, a faction of the Democratic Party in New York State after 1844. The name came from a story current at the time about a farmer who set fire to his barn to free it from rats, the application being that the faction would sacrifice the party to destroy the influence of their political rivals. In 1848 they joined the Free-Soilers and with them nominated Martin Van Buren for president, with the result that the Whig nominee, Zachary Taylor, was elected. The Barnburners were advocates of radical reform measures. See POLITICAL PARTIES IN THE UNITED STATES.

Barnby, Sir Joseph (1838-1896), an English musician, born in York. He occupied the position of chorister or organist in several prominent churches, and in 1871 became precentor and director of the conservatory of Eton College. He later went to London as head of the Guildhall School of Music. Barnby is the composer of many sacred anthems and cantatas, as well as several secular choruses that have been popular in the United States. Among his best-known compositions are *King All Glorious, Rebecca* and *The Lord is King.*

Barnes, Howard Turner (1873-), a Canadian scientist, born in Massachusetts. At the age of six he went to Canada, receiving his education in Montreal and at McGill University. After research work in London, he was appointed lecturer in physics at McGill University, 1900, where he was steadily advanced till by 1909 he was made senior professor of physics. He distinguished himself by his studies on the formation of ice in flowing water, particularly of the phenomenon known as "frazil." Moreover, he improved the construction of thermometers and invented a pyrometer, which is used in regulating furnaces. Professor Barnes has written *Ice Formation and Frazil,* the first authoritative volume on this subject.

Barn'um, Phineas Taylor (1810-1891), an American showman, born in Connecticut. After engaging in various business ventures, such as running a country store, conducting a lottery and editing a weekly newspaper entitled *The Herald of Freedom*—of which the lottery was the only genuine success—he became interested in the show business. The best known of the many attractions which he had on exhibition from time to time, were the famous dwarf, commonly called "Gen. Tom Thumb," and Jenny Lind, whom, in 1847, he brought to America for the first time. In 1871 he established a great traveling exhibition which he styled "P. T. Barnum's Greatest Show on Earth." Mr. Barnum was four times elected a member of the Connecticut Legislature, and was mayor of Bridgeport. Besides holding these positions of honor, he delivered a great many lectures and wrote a number of books. Among his benefactions was a museum building to Tufts College, near Boston, filled with specimens of natural history.

Barom'eter, an instrument used to measure the pressure of air. The simplest barometer is merely a glass tube bent like a U, but with one arm much longer than the other and closed, and

the shorter arm open. The longer arm is filled with mercury, and variations in pressure of the atmosphere tend to raise and lower the level of the mercury in the shorter arm. The cistern barometer acts on a similar principle. It is a straight tube having the upper end closed and the lower, open end immersed in a cistern of mercury.

A wheel barometer is the kind ordinarily known as the weather glass and is seen about people's houses to indicate good and bad weather. A float in the shorter arm of the siphon is attached by a string passing over a pulley to a weight. A needle on the pulley shows the pulley's movement and indicates the raising or lowering of the mercury as the pressure varies. Such weather glasses are not apt to be very accurate, since the most of them are manufactured at one place and are of value only for places of the same altitude, general temperature, etc.

An aneroid barometer acts by means of the variations of pressure shown by a yielding metallic surface. These movements are communicated to a lever, which indicates the variations upon a scale. Mercury barometers are used by the United States Weather Bureau for foretelling change of weather. If the mercury gradually rises, the pressure of the atmosphere is lessening and fair weather is approaching. If the mercury lowers, stormy weather may be expected. A sudden fall indicates a storm while a stationary column shows that the weather will remain unchanged. To be accurate, barometric readings must be corrected for altitude, temperature and capillarity. See WEATHER BUREAU.

Barr, Amelia Edith Huddleston (1831-1919), an American novelist, born at Ulverston, England. Coming to the United States in 1854, she lived in Texas until shortly after the death of her husband, when she removed to New York. She engaged in literary work and has published over 30 novels since 1872. Among these are *Jan Vedder's Wife, Remember the Alamo, A Border Shepherdess, The Maid of Maiden Lane, The Lion's Whelp, A Daughter of Fife, A Sister to Esau* and *The House on Cherry Street.*

Barr, Robert (1850-1912), an English novelist, born in Glasgow, Scotland. He studied at the Normal School of Toronto, Canada, was head master of the Central School, Windsor, Ontario, and became a member of the staff of the *Detroit Free Press,* as well as contributor to it, in 1876. His writings were published under the pen name of Luke Sharp. In 1881 he established the weekly English edition of the *Free Press* in London, and with Jerome K. Jerome founded the *Idler* in 1892, remaining co-editor of the same until 1895. His successful story, *In the Midst of Alarms,* is based on the attempted Fenian invasion of Canada in 1866. Other works include *A Woman Intervenes, In a Steamer Chair, The Face and the Mask, The Unchanging East* and *The Tempestuous Petticoat.*

Bar're, Vt., a city of Washington Co., 6 m. s.e. of Montpelier, on a branch of the Winooski River and on the Central Vermont and the Montpelier and Wells River railroads. The city is widely noted for its granite interests. Barre Township, which formerly included Barre, has some of the largest granite quarries in the United States. There are also machine shops and other manufactories. The Aldrich Public Library and the Goddard Seminary are located here. Barre was settled in 1788 and organized as a town in 1793. It received a city charter in 1894. Population in 1920, U. S. Census, 10,008.

Bar'rel, a hollow vessel, generally bulging in the middle, formed of thin pieces of wood, wider in the middle and tapering toward each end, called staves, and held together by iron or wooden hoops. At the two ends are circular boards, called heads, fitted in grooves in the staves, and that part between these grooves and the end of the staves is called the chine. The structure of a barrel is ingenious, as it combines great strength and lightness. The hoops secure it from the forces of expansion in-

side, and the arched arrangement of the staves enables them to resist the pressure without. A bunghole is provided for filling and emptying barrels which contain liquids. Barrels were formerly constructed entirely by hand, the makers of them being called coopers, but now machinery is employed. The lumber used is principally oak and elm. Some articles packed in barrels are sold at so much per barrel. A barrel of flour is reckoned at 196 lb., a barrel of pork 200 lb. and a barrel of butter at 224 lb. In wine measure a barrel contains 31½ gallons, while a barrel of beer in England contains 36½ imperial gallons. See COOPERAGE.

Bar'rie, James Matthew (1860-), a Scottish novelist and dramatist, born at Kirriemuir. Through journalism he entered upon a literary career, and devoted his attention to delineations of rustic life, in which are equally mingled poetic fancies, whimsical humor and depths of pathos. Among his novels are *A Window in Thrums, The Little Minister, Sentimental Tommy, Tommy and Grizel* and *The Little White Bird.* Success in the dramatization of his novels led to play writing. The most fantastic and delightful of his plays is *Peter Pan.* Others are *The Professor's Love Story, The Admirable Crichton, Alice-Sit-by-the-Fire* and *What Every Woman Knows.* He was made a baronet in 1913.

Bar'ry Corn'wall. See PROCTOR, BRYAN WALLER.

Barry, Sir Charles (1795-1860), an English architect, born in London. He worked with a firm of London architects until 1817, after which he visited Greece, Italy, Egypt and Palestine. He designed numerous churches, the Travelers' Clubhouse in Pall Mall and the building for the Reform Club, the Royal Institution of Fine Arts and the Athenæum, Manchester, and the Houses of Parliament, Westminster; and he reconstructed the treasury buildings, Whitehall.

Bar'ton, Clara (1821-1912), philanthropist, founder of the Red Cross Society in the United States, was born in Oxford, Mass., and educated in Clinton, N. Y. She opened the first public school at Bordentown, N. J., with six pupils, and had 600 when she left. In 1854 she became a clerk in the United States patent office. During the Civil War she devoted herself to the care of the wounded soldiers on the battlefield and in hospitals, and was employed by President Lincoln in the search for missing Union soldiers. After the war she lectured on her experiences in the United States and in Europe, and when the Franco-German War broke out in 1860 she became identified with the International Red Cross Society in the care of soldiers, receiving at the close of the war the decoration of the golden cross of Baden and the iron cross of Germany in recognition of her services. Upon her return to the United States she was instrumental in organizing the American Red Cross Society in 1881, of which she was president until 1904. In 1883, at the request of the United States Senate, she prepared the *History of the Red Cross,* and the next year she represented the United States in the Red Cross conference at Geneva, Switzerland. She rendered valuable services in Cuba during the Spanish-American War in 1898. Miss Barton took an active part in various women's movements, and was an earnest advocate for temperance, equal suffrage and better social conditions for young women.

Barton, Sir Edmund (1849-), an Australian statesman prominent in legislative affairs. He was educated at the University of Sydney, became speaker of the Assembly in 1883 and later served as attorney-general. He was a member of the Federal Convention in 1891, and because of his prominent part in bringing about the confederation of the Australian states, he was made the first minister of external affairs, with the rank of prime minister.

Barye, *Bar"re',* **Antoine Louis** (1796-1875), an eminent French sculptor, born in Paris. Beginning as a goldsmith, he later studied sculpture under Bosio and also at the School of Fine Arts, and

made careful studies from life of animals in the Paris zoological gardens. His right to be regarded as the greatest sculptor of animal life of the French School rests upon such works as *Tiger Devouring a Crocodile, Lion and Snake, Jaguar Devouring a Hare* and the well-known *Lion* of the Column of July, which has been repeatedly reproduced in plaster miniature.

Baryta, *Ba ri' ta.* See BARIUM.

Basalt', a kind of igneous rock, composed chiefly of augite and lime soda feldspar, and frequently interspersed with grains of magnetic iron and particles of olivine. Its texture is usually fine-grained and the color ranges from dark grayish to bluish-black. It is found in immense beds in some localities and occurs in dikes, or veins, in regions that have undergone later volcanic disturbance. It has a tendency to crystallize in four-, six- or eight-sided columns of perfect regularity. The most remarkable of basaltic formations is the Giant's Causeway, Ireland. Interesting formations are also found along the Columbia River in Washington and Oregon.

Base, in chemistry a term generally used to denote the compounds formed by the substitution of a metal for a part of the hydrogen of water. The term, however, is used with different meanings by different chemists. Originally it meant any metal or oxide of a metal which formed a salt when united with an acid. Later it referred to oxides of metals which united with water to form the true bases as defined above, but these are better called *basic oxides.* In organic chemistry ammonia is the true type of a base, and all compounds, which, in organic chemistry, are derived from ammonia, are called bases. See SALT; ACID.

Baseball, an outdoor game so popular in the United States that it is known as the national game. It has been played since the first of the 19th century, but was a far different game then from that now played in every city and village of the United States. Baseball has been traced to various sources; some claim that its forerunner was the English game of rounders played with a large, soft ball and a bat resembling that used in cricket; others think that baseball originated in Philadelphia in the game of townball. However that may be, a game somewhat similar to these was played in the Eastern States up to 1840 and has a modern prototype in One Old Cat, the game at which the American lad first learns to hold the bat, to throw and to catch.

THE GAME. Baseball is played upon a square field, 90 ft. upon a side, called a diamond, at each corner of which is a base; one is known as the home base, and the others named in order from right to left are known respectively as first base, second base and third base. In detail the rules vary from year to year, and these changes may be followed through papers, magazines devoted to athletics, and annual guides to the game. In essentials there are few yearly changes.

Each team, consisting of nine players, is divided into three groups—the battery, the infield and the outfield. The battery is made up of the catcher and the pitcher; the former stands back of the home plate, catches and returns to the pitcher all unhit balls and guards the home plate; the latter stands on a line between the home plate and the second base, 60.5 ft. from the former, and throws the ball across the plate in reach of the batsman's bat. The infield is made up of a shortstop and three basemen located near their respective bases and known as the first, second and third basemen; the shortstop stands between the second and third base outside of the diamond and helps to guard the second base. While the limits of these positions are definitely defined by rule, the men have considerable liberty of movement. The outfield consists of a right fielder, located outside of the diamond far back of the first and second bases, a center fielder, back of the second base, and a left fielder, back of the second and third bases.

BASEBALL

The usual game consists of nine innings, each made up of two halves. In the first half one team has its players located as above, while a batsman from the opposing team takes his position at the home plate and attempts, as the pitcher throws the ball, to hit it in such a manner that he can run to the first base or farther before the ball is caught or before he is touched by the ball in the hands of one of his opponents. The skill of the pitcher depends upon his ability to throw such swift or such curved balls that the batsman is deceived. If the pitcher makes a throw in which the ball does not pass over the home plate at a height between the shoulders and knees of the batsman, it is called a *ball,* and after four such throws have been made, the batsman is allowed to go to first base. On the other hand, if a ball passes over the plate without the batsman's hitting it, whether or not he attempts it, it called a *strike,* and after three strikes the batsman is declared *out* and a second member of his team takes his place. A *foul ball* is one which is knocked outside of the line from the home plate to the first and third bases respectively. Rulings in regard to foul balls differ from year to year.

A run is made when the batsman has made a circuit of the diamond touching each base in succession; this may be done in one play and is then called a *home run,* or may be made from one base to another while the ball is in play. For example, if the batsman gets to first base by means of his own hit, he may reach the second while the pitcher is throwing the ball to the second batsman; the third base and the home plate may be successively reached in the same manner, but if the base runner is touched by the ball in the hands of one of his opponents while he is between bases, or if the ball which he himself batted is caught "on the fly," he is declared out. When three men are out, the half of the inning is over and the teams reverse their positions. The object of the game is to secure as many runs as possible, and the team having the highest number at the end of the ninth inning is the winner. In early baseball, scores of from 50 to 100 runs in a game were not uncommon, and in 1867 great comment was excited over a score of 13 to 8, then considered a remarkably low score. Now the skill of players in the major leagues makes a high score very unusual. In case of a tie at the end of the ninth inning, more innings are played at the discretion of the umpire.

History. Baseball received its modern name when the Knickerbocker Club of New York formulated a set of rules and played with contesting teams on the Elysian Fields near the site of the present city of Hoboken. Other clubs and cities took up the game, and in 1857 a convention was held for the purpose of unifying the rules; the result was the National Baseball Association. The rules of that association would be strange indeed to the modern player. The ball was to be tossed, never thrown, and all curves and deceptive throws were prohibited; the principal regulation in regard to the balls thrown was that they should "come as near as possible to home base."

Baseball was a popular game at the time of the Civil War and soldiers on both sides played with enthusiasm. As the troops disbanded, the game was carried throughout the entire United States and was speedily taken up by men and boys. At first only amateurs played and the games took place upon public grounds where admission was free. Later, the proprietor of a field made an entrance charge, and the proceeds were shared with the players. Thus professional baseball arose. The first professional team was probably the Red Stockings of Cincinnati, that played through 1869 and until June of 1870 without losing a game.

With the development of the professional team came also a change in the rules; and the underhand throw and the curved ball became features of the game. The ball itself was smaller and harder, and mitts, breast-pads and masks began to be used for protection. The official

ball now in use must weigh between five and five and one-fourth ounces and have a circumference between nine and nine and one-quarter inches. It is made with a cork center surrounded by rubber, is well wound and has a cover of horsehide. The bat must be round, not over two and three-fourths inches in diameter at its largest part, and not more than 42 inches in length.

The National Association of Professional Baseball Players, formed in 1871, preceded the National League, which has been in existence since 1875; this league is now an association of the professional clubs of New York, Philadelphia, Chicago, Pittsburgh, St. Louis, Cincinnati, Brooklyn and Boston, and a series of games is played each season. In 1900 the American League, representing Detroit, Cleveland, Chicago, Boston, New York, Washington, St. Louis and Philadelphia, was organized and now ranks with the National League in importance. Aside from these two major leagues numerous minor leagues are in active existence, and there are few cities of any size not having professional teams. Even the smallest villages boast of their teams, which furnish the chief sporting interest in the towns in spring and summer. See INDOOR BASEBALL.

Basel, *Bahl,* a city of Switzerland, the capital of the half-canton, Basel-Stadt, situated near the northern boundary of the country on both sides of the River Rhine. Traces of its medieval origin are everywhere apparent, and the principal buildings include the Rathus, dating from the 16th century, the Barfüsser Kirche, the Cathedral, the Church of St. Elizabeth and the National History and Art Museum. The University of Basel was founded in 1459. As the home of the Holbeins, the city possesses a large collection of their works; in the Historical Museum are portions of the Danse Macabre, once a fresco in the Cathedral burial ground. The commerce and manufactures of Basel are among the most important in Switzerland. The branches of industry represented are ribbon making, dyeing and paper making. The "Baseler Leckerli," or honey-cakes, are famous. Basel joined the Swiss Confederacy in 1501, readily accepted the Reformation, and in 1431 the important ecumenical council was held there. See BASEL, COUNCIL OF.

Basel, Council of, an ecclesiastical council held in the city of Basel from 1431 to 1449. Originally summoned by Pope Martin V, its dissolution was requested by the new pontiff, Eugenius IV, who asked that it meet later at Bologna. This the Council refused to do. Its chief objects in view were the union of the Greek and Latin churches, conciliation of the Hussites and the effecting of certain reforms within the Church. The Council was, on the whole, unsuccessful.

Basil, *Baz' il,* **the Great, Saint** (about 330-379), Bishop of Cæsarea, a distinguished doctor of the Roman Catholic Church. He was a man of exceptional learning and holy life, and won a wide reputation by his writings in which he defended the Church against the heresies of the day. He established monasticism in the East.

Basilisk, *Baz' i lisk,* a lizard of the Iguana Family, found from Mexico south to tropical America. It is distinguished from other lizards by a large air sac at the back of the head, by an erectile crest on the back and by a long, thin tail. Basilisks live in trees along the banks of streams and are active climbers; they are also able to stand upright and run swiftly upon their long hind legs. Their uncouth appearance no doubt suggested the name basilisk, which was once applied to the fabulous dragon which to look upon meant death. See LIZARD.

Bas'ket, a light, open-work receptacle for holding and carrying commodities. It is made by weaving together flexible materials, principally leaves, twigs, strips of wood or wire. The rough commercial baskets and crates are made from splints. These are thin, flat strips of wood which have been split, and are generally of oak, ash, elm or birch. Basket making is one of the simplest of

the mechanical arts and was practiced by the ancient barbarians. The infant Moses was discovered floating in a basket, made water-tight by daubing with mud. The North American Indians made shields of basketwork, on which was applied clay. These were burned in kilns, and the pottery thus produced showed the woven nature of these shields. These Indians once excelled in the making of baskets, especially those ornamented with beads, leather, etc., but now basketry is nearly a lost art among them. Basket making for commercial purposes in carrying our immense crops, especially fruits, is a very large industry. Ingenious machines imitate the movements of the human hand in making them. The finer baskets are made in Holland, Germany and France, and the growing of willows and osier twigs there constitutes a business of large proportions.

Basket Ball, an American game invented in 1891 by James Naismith of the Springfield (Mass.) Young Men's Christian Association, and now played by both sexes, out of doors in good weather, but during the inclement season in thousands of gymnasiums throughout the country. In the Northern States it is the winter substitute for football. The ball used is spherical, from 30 to 32 inches in circumference, consists of an inflated bladder in a strong leather case, and weighs from 18 to 20 ounces. Almost any rectangular space, containing approximately, but not more than, 3500 sq. ft., may be used for this game, if it is free from trees, posts and other obstructions, and is well leveled, or floored. To lessen the possibility of serious injury, a brick or cement floor should be overlaid with smooth, hard-maple flooring.

At each end of the field, or floor, are the *baskets,* cylinders of hammock netting without top or bottom, suspended from metal rings 18 inches in diameter, which are fastened ten feet above the floor and six inches away from the supporting surface. This surface must be smooth, six feet wide and four feet high, and must extend at least three feet above the basket. These baskets are the goals. The five players of each team (right and left guards, a center, and right and left forwards) aim to put the ball into their opponents' basket as often as possible, while protecting their own. The official rules of the game are determined by the Amateur Athletic Union, and vary

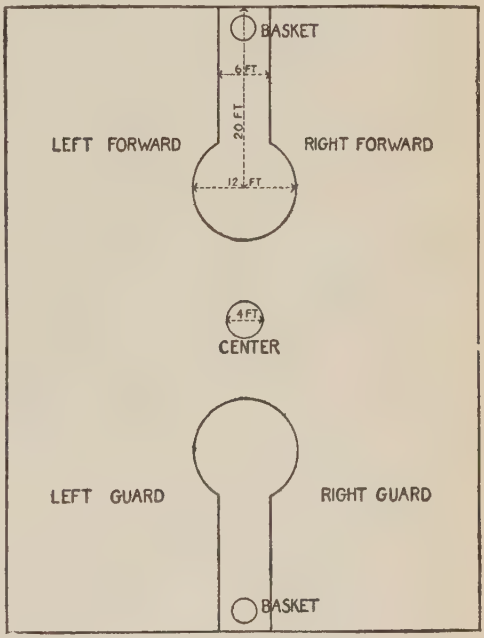


DIAGRAM OF FLOOR

somewhat from year to year. The ball must be thrown, or batted, with the hands, but may not be kicked, punched or carried more than one step. Players may be, and often are, disqualified for undue interference with their opponents, holding, pushing or shouldering being strictly forbidden. Because the constant activity required makes very considerable demands upon one's endurance, the game is played in halves of 20 minutes each, in some cases less. "Throwing a basket" during actual play counts two points for the team that puts the ball into the basket of their opponents. A "free throw," granted by the referee in consideration of foul play by an opponent, permits one to try for a basket from

a position 20 ft. distant, without interference. A successful free throw counts one point.

At the beginning of the game, the ball is put in play by the referee, who, standing at the center of the field, tosses it into the air between the *centers* of the opposing teams, who face each other within a clearly defined four-foot circle. If, at any time during the game, the ball is simultaneously seized by two opponents, the referee puts it in play at this point in the field by tossing it up between these players. Whenever the ball goes outside of the field, it is brought back and either thrown in from the point where it crossed the line, or tossed up at this point by the referee. The game has already won a permanent place among American sports.

Bass, one of the most common groups of North American fresh-water fishes, and a member of the Sunfish Family. There are 12 genera, all of which are well known to young American fishermen. In general they have short, compressed bodies, rounding both above and below the middle line of the body. There is ordinarily a well-marked lateral line and one long dorsal fin. The bodies, which are scaled, are usually beautiful in coloring, though the tones are not so brilliant as are those of the true sunfish; the colors, too, are apt to dim with age. The bass build nests for the reception of their eggs and often guard them until the time of hatching. The flesh of the bass is white and flaky, but if the catch is made at some seasons it is apt to have a muddy taste. The principal species, known in almost all North American lakes, are the calico bass, black bass, rock bass and silver bass; all of these are known locally by a great variety of names. Many have been introduced by the United States Fish Commission into waters in which they were not previously found or from which they were being rapidly exterminated.

Bassoon′, a wind instrument in common use in the orchestra as the natural bass to the oboe, clarinet, etc. It consists of a long, curved mouthpiece and a double wooden tube having holes, some of which are closed by keys and some by the fingers. The bassoon has a range of three octaves.

Bass′wood, a handsome and widely distributed tree of the Linden Family, common east of Montana throughout the United States and southern Canada. It grows straight in the forests, but in the open has a spreading, rounded top, which, when in leaf, casts a deep shade. The bark has long, shallow furrows, gray except at the base, and is exceedingly firm. The stem branches freely and bears large, oval leaves, which are unequally lobed and have an abrupt, pointed apex; the margins are saw-toothed. In winter, the branches have solid, plump leaf buds at rather long intervals on the stem. The flowers of the basswood hang in yellow clusters, whose fragrance is noticeable for some distance and is exceedingly attractive to bees. The seeds have an original method of securing distribution, for each group is provided with a pale, narrow leaflet, which acts as a sail when the wind blows the cluster of ripened, berry-like pods from the tree.

The wood of the basswood is soft, durable and very valuable; it is used for making carriages, woodenware, sounding boards of pianos, furniture and paper, and in wood carving. The inner bark is used for making mats, fish net, cord, shoes and coarse cloth. The oil, extracted from the flowers, is an ingredient of many perfumes.

Bastille, *Bas tele′,* originally a French name for a strongly fortified castle, but now restricted to the state prison in Paris built by Charles V about 1369. It came to be used to imprison persons of high rank, placed there because of court intrigue or at the whim of some high personage, and long stood as a hated symbol of oppression. In July, 1789, as German and Swiss regiments were drawn around the capital, the people of Paris began to fear for the safety of the National Assembly. They armed themselves and attacked the Bastille, which fell after a few hours of feverish

onslaught, on July 14, 1789. The bystanders during the siege killed the garrison and carried their heads through the streets. Soon the whole structure was razed to the ground amid the general joy of the people, and Lafayette sent the keys of the prison to Washington. A column of bronze now marks the site of the Bastille, and the anniversary of its fall is a national holiday in France.

Bat, a widely-known family of Mammals once classed among the birds because of their winged forearms, in spite of the fact that they all have teeth, and fur rather than feathers. In structure the bats most nearly resemble the monkeys, though differing much in size and habits. Their heads and chests are rather large, and the forearms and fingers are elongated to support, like the ribs of an umbrella, the membrane which enables them to fly. This membrane is extended to the hind feet and from there

BAT

to the tail in some species. The eyes of bats are small and almost entirely furcovered, but late experiments have shown that the flying membrane and patches of skin upon the face are so sensitive that they take the place of eyes, enabling the bat to make its way about in the darkness as easily as in the daylight. The hind limbs turn outward, giving the knees a backward bend and rendering the legs of little use in standing; the claws, however, are able to support the bat as it hangs in drowsy state from the branches of trees or barn rafters.

Bats, because of their unpleasant habit of dashing about in the darkness and surprising one by their sudden appearance and disappearance, have been unjustly condemned and made an emblem of uncanny things. In reality, with exception of the vampires, they are harmless creatures which aid in destroying Rodents and unpleasant nocturnal insects. See VAMPIRE.

Batangas, *Bah tahn' gahs,* a military station and port of the Philippines, located in the Province of Batangas upon the Island of Luzon. It is the capital of its province, and is a pleasant, modern city with broad streets and palatial homes. It is located in the midst of a rich agricultural district. Population, 40,000.

Bata'via, the capital and principal city of the Dutch East Indies, situated on the Bay of Batavia on the northern coast of Java. The old city lies near the water's edge and is the seat of the manufacturing industries and the home of the natives and the Chinese. High mortality on the banks forced the Europeans to remove to the more elevated parts, and the architectural characteristics of their quarters resemble those of Dutch towns. The government buildings in the city are magnificent; among the finest public edifices are the governor-general's palace and the Museum of the Batavian Society of Arts and Sciences. Large enterprises connected with the excavation of the ancient Japanese temples have furthered, to a considerable extent, the science of archæology; in public utilities, educational institutions and commerce Batavia is not inferior to any European city of its size. It is the most important city for the export trade of the Dutch East Indies and maintains direct communications with Great Britain, Netherlands, Germany and Australia. It is the seat of a United States consul. The population numbers over 138,000 (principally Chinese).

Batavia, N. Y., county seat of Genesee Co., 36 m. e. of Buffalo, on the Erie, New York Central and the Lehigh Valley railroads. The New York State Institute for the Blind is located here; also the Holland Purchase Land Office,

which contains relics of the early history of the state, and a monument to William Morgan, erected by Anti-Masons in memory of one of their number, who, it was charged, was killed in 1826 for threatening to reveal Masonic secrets. Batavia is an important manufacturing center, producing shotguns, shoes, interior woodwork and agricultural implements. Population in 1920, 13,541.

Bates, Arlo (1850-), an American author, born at East Machias, Me. He was editor of the Boston *Sunday Courier* from 1880 to 1893, and was afterwards elected professor of English in the Massachusetts Institute of Technology. Among his writings are the novels, *The Pagans, The Philistines* and *Love in a Cloud;* the poems, *A Poet and His Self* and *Under the Beech Tree;* the criticisms, *Talks on Writing English* and *Talks on the Study of Literature.*

Bath, a word used to denote the immersing of the body in water for the purpose of cleansing for comfort or for health. The term may also be taken to mean the subjecting of the body to any liquid, gaseous or solid substance or to oil, milk, wine, vapor, sand or mud in an effort to derive benefit to health therefrom. Water is, of course, the chief bathing medium and is in universal use. The practice of bathing is as old as history. In some ancient civilizations it took the form of a religious rite. The Greeks and Romans maintained public baths, those of the Romans being very elaborate. In medieval times the religion of Arabia made bathing obligatory, and a process of cleansing was then developed which was imitated by the modern Turks and which has been adapted in all parts of the world. The Turkish bath requires an arrangement of chambers of varying degrees of heat and supplied with hot-air pipes and lavatories. The bather is exposed to high temperatures, which cause a profuse perspiration. He is then washed with cold water by an attendant, placed on a table and scrubbed with soap and warm water and massaged with salves. After this he is left to repose on a couch in a cooler room. The Russian bath treats with steam, but otherwise is similar to the Turkish bath.

There are various kinds of baths for specific diseases, and some of the medicinal springs of Europe and America are highly beneficial for bathing purposes. Sea bathing is invigorating for persons of good physique, but may be dangerous for those in poor health. The cold, early-morning plunge also has its advantages for robust persons, but should be avoided if, instead of reacting with a glow, the body remains chilled afterwards. Hot baths are weakening and should be indulged in only occasionally. The daily bath of persons in average health should be taken in tepid water. However, the effects of temperature are different in different individuals, and each one should discover for himself the kind of bath which produces the best result.

Bath, a fashionable watering-place of southern England, located in Somerset Co., 12 m. s.e. of Bristol and 100 m. s.w. of London. It is an old city, noted for its baths in the time of the Roman Emperor Claudius, and extensive ruins of Roman constructions are still to be seen. The city is set in the midst of a group of hills, and the fashionable quarters extend in terraces up their slopes. The most interesting edifices are the abbey church, St. James's, St. Michael's, a theater, an assembly hall and the buildings connected with the baths. Royal Victoria Park and Sidney Gardens are favorite places of recreation. The city is the site of several educational institutions. Population, 51,000.

Bath, Me., port of entry and county seat of Sagadahoc Co., 30 m. s. of Augusta and 36 m. n.e. of Portland, 12 m. from the Atlantic Ocean, on the right bank of the Kennebec River and on the Maine Central Railroad. It has steamboat communication with Portland, Augusta and Boston. The town is an important shipbuilding point. A number of modern torpedo boats for the United States navy have been built here. Bath is admirably situated as a commercial

port, and has a large coastwise and foreign trade in coal, ice, lumber, hay, iron and steel. The manufactures of the place are such as relate chiefly to shipbuilding, and include cordage, windlasses, ship blocks, marine engines, iron goods, boilers, etc. The city contains a soldiers' and sailors' orphans' home and two homes for aged persons. The first settler, who came in 1660, was an Indian missionary by the name of Robert Gutch. In 1781 the place was incorporated and in 1847 a city charter was secured. Population in 1920, 14,731.

Baths, Roman, public or private buildings often of great magnificence, containing apartments for bathing. The public baths were first in use and were long buildings divided by two halls, one for each sex. During the fourth century there were said to be over 800 of these in the city of Rome, not counting the imperial baths or the private baths which were then being built in great numbers. With the introduction of artificial heat the baths became known as *thermæ,* and were a meeting place of the rich and of the educated during their leisure hours. Aside from the swimming tanks, there were gymnasiums, reading rooms, lecture rooms, gardens, running tracks and every luxury that skill could devise for the comfort of the public. The most celebrated of the Roman baths were: the baths of Agrippa, probably the first of the Roman *thermæ* and the marble pillars of which were excavated in 1881; the baths of Caracalla, which contained great museums and picture galleries; the baths of Diocletian, most extensive of all and having space for fully 3000 people at one time; and the baths of Titus, the ruins of which lie northeast of the Colosseum.

Baton Rouge, *Bat'un Roosh',* **La.,** a city, parish seat of East Baton Rouge Parish and capital of the state, about 80 m. n.w. of New Orleans, on the east bank of the Mississippi River and on the Yazoo & Mississippi, the New Orleans, Texas & Mexico, Morgan's Louisiana & Texas and the Louisiana Railway & Navigation Company railroads. The city is picturesquely located on a high bluff secure against river floods, and commands extensive views of the river and surrounding plantations. Large quantities of cotton, sugar, fruit and corn are produced, and the city has important manufacturing interests. Many of the houses of the city are old and quaint and of the Spanish and French style of architecture. The noteworthy buildings include the state capitol, built in 1880-82, replacing the one burned in 1862, a courthouse, city hall, post office, several banks and a number of churches. A national cemetery is located here.

Baton Rouge is the seat of the state university organized in 1860. The agricultural and mechanical college, of which the Audubon Sugar School is a distinctive feature, is affiliated with the university. This school is for scientific training in the growing of sugar cane and manufacture of sugar. Other institutions include a state agricultural experiment station and a high school. The city also contains an orphan asylum, institutions for the blind and deaf and a state penitentiary. The varied manufacturing interests include cottonseed products, sugar, molasses, brick, lumber, artificial ice and agricultural implements.

The city was one of the earliest French settlements in Louisiana. As a part of West Florida, it passed into British hands in 1763, and in 1779 was captured by the Spanish governor of Louisiana. The town was incorporated in 1817. Baton Rouge was the capital of the state from 1849 till 1864, when the seat of government was removed to New Orleans. It was reestablished here in 1882. The ordinance of secession of Louisiana was passed at Baton Rouge on Jan. 26, 1861. The city was taken by the Federal army May 7, 1862. The city was evacuated for a month, then reoccupied by government troops, who remained until the close of the Civil War. Population in 1920, U. S. Census, 21,782.

Batrachia, *Ba tra' ki a,* or **Amphibia,** *Am fib' i a,* a group of vertebrate animals

including the newts, salamanders, toads and frogs. In zoological classification this group lies between the Fishes, from which the Batrachians are supposed to have developed, and the Reptiles, to which in turn the Batrachians are supposed to have given rise. All are creeping, cold-blooded animals, having a clammy, scaleless skin; their chief peculiarity is their development, for in all families of this group the young, which are hatched from eggs, are fishlike and live in the water, breathing by means of gills; as they develop they become terrestrial, lung-breathing animals which more nearly resemble the Reptiles. Even in the adult stage, however, the Amphibians require moisture and without it die or become temporarily torpid. The Amphibians are grouped in two main divisions: the tailless, including toads and frogs; and the tailed, or newts and salamanders. Together they comprise the smallest of vertebrate groups.

Bat'tering-Ram", an instrument of war used in ancient and medieval times. When and where it originated is not known. It is mentioned by Ezekiel, and the Greeks passed it down to the Romans. The ram consisted of a beam ranging from 60 to 120 ft. in length, protected at the battering end by a head of bronze or iron resembling a ram's head. This head often weighed more than a ton, the whole ram sometimes requiring more than 100 or more men to operate it. The ram was sometimes suspended and swung by drawing it back with ropes and releasing it, and sometimes it was mounted on wheels or rollers and forced rapidly forward to the point of contact. The men who worked it were protected by a roof built over it. The battering of this engine would make a breach in almost any wall, if continued long enough.

Bat'tle Creek', Mich., a city of Calhoun Co., 45 m. s.w. of Lansing, 121 m. w. of Detroit and 163 m. e. of Chicago, at the confluence of the Kalamazoo River with Battle Creek, and on the Michigan Central, the Grand Trunk, the Detroit, Toledo & Milwaukee and other railroads. Interurban electric railroads connect with the neighboring towns and cities. Battle Creek is situated in a fertile agricultural region and has considerable trade in dairy products, grain, fruit and live stock. The city is noted for its manufacture of cereal foods.

Parks and Boulevards. The city contains broad, well-paved streets and boulevards and many handsome residences surrounded by lawns and gardens. There are a number of parks, one of which, at Goguac Lake, is an attractive summer resort. There are numerous small lakes in the vicinity.

Public Buildings. Among the most prominent buildings are the post office, auditorium, Post Tavern, Ward Building, banks and theaters. The Y. M. C. A. Building is the gift of the late Charles Willard. There are about 20 churches. The city is known as one of the largest centers of the Seventh Day Adventists.

Institutions. The educational institutions include a high school, public and parish schools and a public library, the gift of Charles Willard. Other institutions are the Battle Creek Sanitarium, which was a pioneer in dietetic reform, and a well-equipped hospital presented to the city by the late John Nichols.

Industries. Battle Creek is an important manufacturing center, its excellent water power contributing largely to the prosperity of the city. There are large threshing-machine, steam-pump, locomotive-boiler and traction-engine plants, and manufactories of cereal foods, gas stoves, printing presses, cereal machinery, gasoline engines, printing ink, paper, brass specialties, harness, locomotives, coffee roasters, wall registers, automobile lamps, steel stamped goods, hose fixtures, cigars, confectionery, paper cartons and boxes and planing-mill products. Extensive railroad repair shops are also located here.

History. The first settlement was made in 1832 by people from New York and New England. The name is claimed to have arisen from hostilities here between surveyors and Indians. The village was incorporated in 1850 and a city

charter granted in 1859. A revised charter was given in 1900. Population in 1920, U. S. Census, 36,164.

Bat'tleship. See WARSHIP, subhead *Battleship*.

Baucis, *Bau' sis,* **and Philemon,** *Fi le' mon,* an aged couple famed in myths. Extremely poor, they dwelt in a humble cottage in a small town of Phrygia, to which place one evening Jupiter and Mercury came in the guise of men. They sought refreshment, but all doors were closed against them until they applied to the aged pair, who received them hospitably and offered the best that the cottage afforded. While at supper, Baucis and Philemon were amazed to see that the wine bowl was replenished as fast as it was drained, and this gave them their first suspicion as to the divine nature of their guests. Acknowledging their identity, the gods declared that they intended to destroy the impious town, and ordered the aged couple to leave their home and ascend a nearby hill. Baucis and Philemon obeyed, and in a trice the town became a lake. Their own cottage alone remained, and, while they were deploring the fate of their neighbors, it was transformed into a temple, where, by their own wishes, Jupiter permitted them to officiate. Their one remaining desire now was that they might be united in death as in life. Accordingly, one day as they stood before the temple, each saw the other put forth leaves. The aged couple had become an oak and a lime tree.

Bauxite, *Bo' zite,* an ore from which aluminum is made. It occurs in granular or claylike masses, varying in color from white to yellow, red or brown. It is found in parts of Ireland, Austria, and, in the United States, in Alabama, Georgia and Arkansas. In addition to its use as an ore of aluminum, it is also employed in the manufacture of alum and for lining converters and furnaces in the manufacture of steel. See ALUMINUM.

Bava'ria, a prominent State of the German Republic, next to Prussia in size and population. The area is 29,282 sq. m., or a little less than that of South Carolina. Bavaria occupies the eastern part of the southern extension of the republic, and is bounded on the e. by Austria, on the s. by Switzerland, on the w. by Württemberg, Baden and Hesse-Darmstadt and on the n. by Prussia and Thuringia. It is divided into two parts, the eastern, or Bavaria proper, and the western, or Rhenish Bavaria. The Böhmerwald Mountains extend along the eastern boundary, except in the south, while toward Tyrol altitudes of 9000 and 10,000 ft. are reached. The mountains seldom exceed 3000 or 4000 ft. The country is drained principally by the Danube and the Main. The former, entering from Swabia, extends entirely across the country and is navigable all the way. The Main crosses the northern part of the country. In the mountainous parts of the country are numerous lakes. Much of the area drained by the Danube is a low plateau, having an altitude of a little over 2900 ft. About one-third is covered with forests and about one-half cultivated.

Bavaria was early inhabited by the Celtic Boii, a tribe conquered by the Romans about 15 B. C. Charlemagne made it one of the marks of his empire. In 920 the duchy of Bavaria was instituted but it only included that part of the present states south of the Danube. Other portions of south German territory were added from time to time noticeably so in 1620. The Bavarians owing to their mixed ancestry and physical features of their country are not in some respects the same as the north Germans, but they in general aligned themselves with the German states at times, however, they sided with France and as a reward for such service Napoleon established the kingdom of Bavaria. Bavaria sided with Austria in the Seven Weeks War against Prussia and the north German Confederations. But joined that confederation in 1870 and took a prominent part in the organization of the empire. It became a republican state of Germany in 1919. Population about 6,200,000.

Bax'ter, Richard (1615-1691), an English Puritan divine, born in Rowton. He became minister at Kidderminster in 1641 and served in that position, with brief intermissions, for 19 years, accomplishing notable reforms. When the Civil War broke out in 1642 he became military chaplain. He opposed the execution of the King and the election of Cromwell, and became king's chaplain after the Restoration. Throughout his life he remained a moderate Nonconformist. His writings are learned and elaborate and number about 168. Among the most popular are *Saints' Everlasting Rest, Call to the Unconverted, Reasons for the Christian Religion, Christian Directory* and *Catholic Theology.*

Bayard, *Ba" yar',* **Pierre du Terrail,** SEIGNEUR (about 1476-1524), known as "the knight without fear and above reproach" (*Chevalier sans peur et sans reproche*), born in France. He served with distinction under Charles VIII in the war with Italy, and later won brilliant victories over the Spaniards and the English. After the Battle of Marignano he had the honor of conferring knighthood on young Francis I, and was called the savior of his country. He was killed in Italy, while guarding the passage of the Sesia. Representing a chivalry free of extravagance, with his romantic heroism and magnanimity he was one of the most beautiful characters in medieval history.

Bay'ard, Thomas Francis (1828-1898), an American statesman, was born in Wilmington, Del. He was admitted to the bar in 1851 and became known as a capable lawyer. He served in the United States Senate from 1869 to 1885, being elected president *pro tem* of that body in 1881, when Vice-President Arthur succeeded Garfield in the presidency. In 1885 he left the Senate to become President Cleveland's secretary of state. During Cleveland's second term Mr. Bayard was appointed ambassador to England, in 1893. Oxford honored him with the degree of doctor of laws. He was a thoroughgoing Democrat, an insistent advocate of states' rights, and ranks among the able statesmen and scholars of America.

Bay City, Mich., a city, port of entry and county seat of Bay Co., 108 m. n.w. of Detroit, on the Saginaw River, 4 m. from its entrance into Saginaw Bay, and on the Pere Marquette, the Michigan Central, the Grand Trunk, the Detroit & Mackinac and the Detroit, Bay City & Western railroads. The Saginaw River, here crossed by several bridges, is navigable to this point for the largest lake vessels. There is an excellent street-car system, and interurban electric lines extend to Saginaw and other towns and cities throughout the Saginaw Valley. Bay City is situated on both sides of the river in an agricultural region, and has extensive coal-mining, lumber, fishing, boat-building and beet-sugar interests.

PARKS AND BOULEVARDS. The city contains well-paved and shaded streets and many handsome residences. Wenonah Park and a number of other parks are maintained by the city.

PUBLIC BUILDINGS. Among the noteworthy buildings are the city hall, Federal Building, Masonic Temple, Bay City and Elks' clubhouses, banks, a courthouse and substantial business houses. There are about 36 churches and missions.

INSTITUTIONS. The educational institutions include a county normal training school, a high school, public and parochial schools, Holy Rosary Academy, an oral school for the deaf, the public and Bay County Bar libraries and a business college. Among the benevolent and charitable institutions are the Mercy, the Lewis and the Bishop hospitals and the woman's and children's homes.

INDUSTRIES. Bay City is the port of entry for quantities of lumber imported from Canada and the Upper-Michigan and Lake Superior district. Near the city are valuable coal mines, while one mine has been developed within the city limits. In Bay City are a number of shipbuilding plants and an extensive dry dock. Large beet-sugar factories are lo-

cated in the city and suburbs. There are also salt works, marine-engine plants, flour mills, chicory works, knitting mills, elevator works and manufactories of woodenware, alcohol, beet-sugar mill machinery, veneer, railroad machinery, roller shades and windmills. Vast quantities of flooring, shingles, posts, railroad ties and hemlock bark are handled annually.

History. Bay City was formed by a number of settlements of Lower Saginaw in 1837. The place was incorporated in 1859 and chartered as a city in 1865. West Bay City was annexed to Bay City in 1905. Population in 1920, U. S. Census, 47,554.

Bayeux, *Ba"yu',* **Tapestry,** a piece of embroidery made in early medieval times and containing a series of pictures representing the Norman invasion and conquest of England. The tapestry is supposed to have been made by the wife of William the Conqueror and her attendants. It is 230 ft. long, about 20 inches high and contains over 1500 figures, with inscriptions in Latin, and is one of the most remarkable works of its kind ever produced. It takes its name from the fact that it was found in the Cathedral of Bayeux, and it is kept in the library of that city. See Tapestry.

Bay'onet, a short, swordlike weapon, to be attached to the muzzle of an army musket or rifle. The old bayonet was long and three-cornered; the modern arm is flat and about 12 to 14 inches long. When not in use it is carried at the side in a scabbard. It is effective in resisting a cavalry attack in the final shock of an assault, and in the World War was much used in hand-to-hand fighting in the trenches.

Bayonne, *Ba" yone',* **N. J.,** a city of Hudson Co., 6 m. s.w. of New York on a peninsula between New York harbor and Newark Bay, and on the Central of New Jersey, the Lehigh Valley and other railroads. Bayonne adjoins the south boundary of Jersey City, from which it is partly separated by the Morris Canal, and opposite Staten Island, from which it is entirely separated by a strip of water called the Kill von Kull, which is open for navigation for ocean liners. Bayonne has a total water frontage of ten miles and an area of four square miles. The city was formed by a consolidation of a number of former villages comprising Bayonne, Centerville, Bergen Point, Constable Hook and Pamrapo. The residential portion of Bayonne is attractive and contains fine homes of many New York City business men. The Hudson County Boulevard passes through the city, and there are electric railway lines to Jersey City, Newark and other near-by towns and cities.

Public Buildings. The principal public buildings include the city hall, post office, city hospital, a large public library and about 33 churches.

Industries. Besides having considerable interest in the commerce of the port of New York, Bayonne is an important manufacturing center. The city is the principal petroleum-distributing point along the Atlantic seaboard, and has enormous storehouses and refineries with connecting pipe lines with the Pennsylvania and Ohio oil fields and with New York, Philadelphia, Baltimore and Washington. Other industries are represented by petroleum-refining and borax works, electric launch and motor works, copper-refining and nickel-smelting works, silk factories, paint and color works, tubular-boiler factories, ammonia, nitric and sulphuric-acid works, soap factories, wire-cable works, metallic-bed works, foundries and machine shops. The Port Johnson coal docks, situated on the Kill von Kull near Bergen Point Station, are very extensive.

History. Bayonne was settled by the Dutch about 1670 and was originally a part of Bergen. It was set off as a township in 1861, chartered as a city in 1869 and rechartered in 1872. Population in 1920, U. S. Census, 76,764.

Beacon, *Be' kon,* a signal fire or light, usually displayed from a height. Beacons have been in use from the earliest times. The prophet of Israel, Jeremiah, spoke of a beacon fire. Such references

are also found in Persian and Greek writings. In England beacons were maintained by a tax. In the United States a knoll in Boston was known as Beacon Hill (leveled in 1811), and Beacon Street still perpetuates the name. The beacons lighted there warned of danger from the Indians. Lighthouses and lights placed to assist mariners in getting the triangulation of the coast are now called beacons.

Beaconsfield, *Be' konz field,* **Earl of.** See DISRAELI, BENJAMIN.

Bean, a genus of plants, or the seed of those plants, belonging to the Pulse, or Pea, Family and forming an important source of food for man and for cattle. The plants may be herbs, vines or even fibrous shrubs, but those cultivated are generally small and bear butterflylike blossoms which are followed by pods bearing seeds. These seeds, or beans, are among the most nutritious of foods and are raised in great quantities in the United States. The plants are valuable to the farmer, for they bear upon their roots tubercles consisting of bacteria which are able to take free nitrogen from the air and from the subsoil and store it in the form of plant food. Since nitrogen upon the market in the form of fertilizer costs at least 15 cents a pound, while beans produce the same amount for practically nothing, their value is thus more appreciated. There are many varieties of beans grown in all temperate climates. The common bean is the kidney bean, probably a native of South America. It is easily raised and the beans find a ready market. When the pods are ripe, the plants are pulled and dried, after which they are thrashed to remove the pods from the seeds. Michigan, California, Maine and New York lead in their production. The average annual crop in the United States is over 12,000,000 bushels. String beans are kidney beans having fleshy, edible pods.

Other popular species are: the Lima bean, which is a tall pole-bean plant having large flat seeds that are eaten while green; and the soy bean, a Japanese and Chinese bean which is grown in the United States as a forage plant or a fertilizer, since its roots bear the largest tubercles of any of the beans.

This last-named species is a valued food product in Eastern countries, especially China, where some preparation of the soy, or soya, bean is used at every meal. It is said to contain more ingredients of a perfect food than any other known product. In France a large number of preparations are being experimentally prepared from it; they include milk, cheese, casein, oil, jellies, flour, breads, cake and sauces. An oil made from it is said to be a rival of linseed oil for mixing paints. Two hundred-eighty varieties of soy beans are known, all of which may be advantageously raised as restorative crops or for fodder.

Bear, a family of heavy, fur-bearing animals, species of which are found in almost all parts of the globe. In general, bears are clumsy animals with large limbs, whose size seems all the greater because of their loose skin and shaggy fur. The body of the bear is heavy, the feet strong-clawed and naked-soled, and the tail so short as to be practically concealed by the long fur. The head of the bear resembles that of the dog, but is flatter across the forehead and less prominent below the small, rounding ears; the teeth differ in being blunter and more fitted for grinding than those of most flesh-eating animals. Bears live upon all kinds of food and seem to subsist equally well upon a diet of berries, roots, tender bark, lichens and young foliage, or upon eggs, small wood animals, pigs, calves and sheep. They are exceedingly fond of honey and will brave the pain and discomfort of an attack by angry bees in order to procure the guarded sweets. Many become expert fishermen and haunt fishing streams with the persistence of devoted anglers. Others pursue game less worthy of their size, being fond of grubs of such insects as ants and flies.

Bears are solitary animals and are most frequently found singly; if in company the group generally proves to be a mother with her cubs. Their home is in a rocky

cave, hollow tree or sheltered dell. The female hibernates but does not become torpid, seeming merely to be waiting for the coming of warmer days and more abundant food. The male, however, roams about through the long nights of even the coldest regions, and lives by preying upon the few other animals which can also endure the cold.

Bears are not especially to be feared unless attacked, and then only a mother defending her cubs is really ferocious Because of their small sleepy eyes, lumbering shuffle and general awkwardness, bears are comical animals whose antics are mirth-provoking; they roll, gambol and leap with a kittenish playfulness, hardly in keeping with their size and build. In captivity they become tame and may be taught tricks.

There are nine distinct species of bears: the polar, or ice bear, of the Arctic regions, a long animal, yellowish or white in color; the brown bears, the largest and heaviest species known, of which there are many varieties, varying in color from tan to dull, dark brown; the grizzly, of western United States and Canada, a large broad-headed species; the American black bear, a small animal, whose hind feet are smaller than its fore; the Asian black bear, whose breast has a light-colored chevron; the glacier bear, a small bear with soft woolly fur; the sun bear, which is black with a yellow breast; the sloth bear, a small animal of India and Ceylon; the Andean spectacled bear, whose name was applied because of the tan-colored marks about the eyes; and the Tibetan parti-colored bear, which is a grayish animal, bulky in form and found only in eastern Asia.

Bear'berry, a trailing herb of the North woods and rocky hillsides and a member of the Heath Family. The little vines grow so thickly over the otherwise bare rocks and waste lands as to form thick mats with their blunt-pointed, evergreen leaves. A cluster of bell-like, nodding flowers appears early in the spring and is followed by bright red berries, which have five plainly-marked, seeded cells. The leaves of the bearberry are used in medicine.

Bear Lake, Great. See GREAT BEAR LAKE.

Bear, The (Russia), the emblem of Russia and a national nickname for a Russian. The poet Campbell in his *Poland* thus embodies the appellation:

"France turns from her abandoned friends afresh
And soothes the Bear that prowls for patriot flesh."

Beatrice, *Be' a tris,* **Neb.,** a city and the county seat of Gage Co., 40 m. s. of Lincoln, on the Big Blue River and on the Union Pacific, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific and other railroads. Ample water power is supplied by the river, and the manufactures include flour, barbed wire, plows, gasoline engines, windmills, hay balers and tiles. There are gristmills, a large creamery, a canning factory, an iron foundry and planing mills in the town, and in the vicinity valuable stone quarries. At Beatrice is located a state institute for the feeble-minded; and the public library, courthouse and Federal Building are of importance. Settled in 1859, Beatrice was incorporated in 1871 and two years later was chartered as a city. Population in 1920, U. S. Census, 9,664.

Beatrice Portinari, *Ba" ah tre' chay Por" te nah' ree,* the Beatrice of the poems of Dante, a daughter of a wealthy citizen of Florence. Dante first saw her when she was but eight years of age, but from that time until his death she was the object of his ardent and sincere affection. In the *Divine Comedy,* Beatrice, who is represented as Dante's guide through the nine heavens, symbolizes the supernatural aid by which man attains complete knowledge of God. See DANTE, ALIGHIERI.

Beaumarchais, *Bo" mahr sheh',* (1732-1799), the name assumed by Pierre Augustin Caron, a French dramatist, born in Paris. His musical talents attracted attention at court, and he first distinguished himself in literature by his *Mémoires,* the wit and satire of which

entertained all France. His support of the French Revolutionists forced him to seek safety by leaving France. As a dramatist his reputation rests on the plays, *Eugénie, The Barber of Seville* and *The Marriage of Figaro,* the last of which created an extraordinary sensation in Paris.

Beaumont, *Bo' mont,* **Francis** (1584-1616), and **Fletcher, John** (1579-1625), two English dramatists. Their friendship was established in 1607, and in the half dozen years which followed their association was so intimate and their collaboration so successful that their respective shares in the authorship of their plays can be separated with difficulty. They emphasized plot rather than character, and their works contain a strange mixture of coarseness and idyllic sentiment. By their contemporaries they were ranked superior to Shakespeare. Among the best plays which they produced, either separately or together, are *The Woman Hater, The Knight of the Burning Pestle, The Faithful Shepherdess, The Coxcomb, The Maid's Tragedy, Cupid's Revenge* and *A King and No King.*

Beaumont, *Bo'mont,* **Tex.,** a city and the county seat of Jefferson Co., 80 m. n.e. of Houston, on the Neches River and on the Southern Pacific, the Gulf, Colorado & Santa Fe, the Gulf & Interstate, the Texas & New Orleans, the Port Arthur Route and the Beaumont, Sour Lake & Western railroads. The neighboring pine and hardwood forests and excellent transportation facilities have given the city an important place as a lumber center. The trade in live stock and rice is considerable. Three of the largest rice mills in Texas are located here. The manufactures include foundry and machine-shop products, brick, tile, cars, furniture and ice. Petroleum, one of the city's chief resources, has contributed largely to its prosperity and growth. Among the prominent buildings are the Federal courthouse and post office, the Jefferson County courthouse, city hall, the Y. M. C. A. Building and Y. W. C. A. Ship building and oil refining are important industries; it was chartered as a city in 1889. Population in 1920, U. S. Census, 40,422.

Beauregard, *Bo' re gard,* **Pierre Gustave Toutant** (1818-1893), a Confederate general, born in New Orleans. He graduated at West Point, served in the Mexican War and in 1860 was appointed superintendent of West Point, a position which he resigned to join the Confederate army. As brigadier-general in command at Charleston, he began the war by bombarding Ft. Sumter. He served with efficiency at the first Battle of Bull Run, at Shiloh and at the defense of Charleston, and was in command at Petersburg, Va., in 1864. While serving with the Division of the West he surrendered with Johnston to General Sherman in April, 1865. After the war Beauregard became president of the New Orleans, Jackson & Mississippi Railroad and in 1878, adjutant-general of Louisiana.

Beaven, Robert (1836-), a Canadian statesman, born in England. He early engaged in gold mining in British Columbia and later removed to Victoria. He was the first secretary of the Confederate League, upon union with the Dominion represented Victoria, 1871 to 1894, was subsequently mayor of Victoria and meanwhile was appointed chief commissioner of lands and works and minister of finance and agriculture. As premier of British Columbia, his government was defeated in 1883, when he resigned. While in office he had been concerned with commencing the Canadian Pacific, with constructing the Esquimalt Graving Dock and with establishing free, nonsectarian schools.

Beaver, *Be'ver,* one of the largest and most interesting of Rodents, the many species of which are grouped in the Beaver Family. It has a roundish head, small ears, blunt nose and a plump, fur-covered body. Its teeth, especially the incisors, are long and exceedingly sharp, as are also the claws of the forefeet; the hind feet are webbed and comprise its organ of locomotion in water. The chief peculiarity of the beaver is its flattened

tail, which is an oval mass of fat and muscle covered by a stout, ribbed skin. Many stories are told of the strange uses to which this organ is put, such as making of it a trowel with which to dig, a flat boat for carrying mud for its lodge, or an instrument for smoothing the walls; too much, however, has probably been accredited to this odd-shaped member, and its actual usefulness seems to consist in its value as a signal giver when its sharp slap upon the water, as the beaver dives, gives warning of the approach of danger.

Beavers are industrious animals. They often live in large communities but do not, like ants or bees, seem to have any organization. For their homes they select a slowly-moving stream, which they dam by cutting large trees in such a way that they fall athwart the stream and form a foundation to be filled in and enlarged with mud and sticks. The house, or lodge, has its floor above water, but its two entrances are below; like the dam it is built of mud and sticks carried by the beaver between its forepaws and its chin as it swims.

Being nocturnal animals, beavers are seldom seen at work, but the results of their labors are shown in flooded woodlands, where the dying trees, wet roads and many conical-topped stumps bear mute witness to the beaver's skill. In many states the beaver is protected by law, since it was being hunted almost to extermination for its soft fur, which is a valuable acquisition to the trapper's bag. Castoreum, a substance secreted by the beaver, is of value as a medicinal drug.

Beaver Falls, Pa., a city of Beaver Co., 31 m. n.w. of Pittsburgh, on the Beaver River and on the Pennsylvania and the Pittsburgh & Lake Erie railroads. It is connected by bridge with New Brighton. The city is in a region abounding in natural gas and coal, and there are located here extensive steel, wire, nail, tube, glass, file and bridge works, saw, planing and rolling mills and manufactories of gas engines. Geneva College (Reformed Presbyterian), organized in 1848, is located in College Hill borough, one mile north. Beaver Falls, originally called Brighton, was chartered as a city in 1868. Until this time the town was only a small village, but the Harmony Society purchased the entire tract of land and started the growth in population, until it is at this time the largest city in Beaver County. Population in 1920, U. S. Census, 12,802.

Bebel, *Ba' bel,* **Ferdinand August** (1840-1913), a German statesman, leader of the Social-Democratic Party. While engaged as a master turner in Leipsic in 1864, he identified himself with the socialistic movement among the working classes, and in 1869 assisted at Eisenach in the organization of the Social-Democratic Party. Three years later he was sentenced to imprisonment for two years and nine months on the charges of projected high treason against the Kingdom of Prussia and of violating the dignity of the Emperor of Germany. After 1871 Bebel served almost continuously in the Reichstag. In 1891 he became a member of the staff of the *Vorwärts* at Berlin. He was an effective orator and the author of numerous publications.

Bechuanaland, *Bech" oo ah' na land",* since 1909 a part of the Cape of Good Hope Province in the South African Union. See SOUTH AFRICA, UNION OF.

Beck'et, Thomas (about 1118-1170), an English clergyman, born in London. He was made chancellor of England in 1155 by the ruling sovereign, Henry II, and in 1162 was elected Archbishop of Canterbury. He soon came into conflict with Henry, opposing the King in the matter of taxation and maintaining fearlessly all the prerogatives of the Church. When Henry caused the Constitutions of Clarendon to be drawn up, embodying the ancient customs of the country, Becket refused to seal them, following which a bitter struggle ensued. In 1164 Becket was obliged to flee to France, where he remained for six years. In 1170, restored to favor, he returned to England, only to enter into another controversy with Henry. Having refused to absolve the bishops who had previously

taken part in the unlawful coronation of the Archbishop of York, Becket was murdered in the Cathedral of Canterbury by certain followers of Henry. For this atrocious crime the King was compelled to do public penance. In 1173 Becket was canonized, and 1220 his remains were deposited in a splendid shrine, which has become memorable because of its connection with Chaucer's *Canterbury Tales.*

Bed, in a general sense, any place to sleep in or any article to sleep or rest on; but in furniture a distinction is made between a bedstead and the bedding contained within it. We are accustomed to think of a bed as consisting of a bedstead, a spring, a mattress, sheets, pillows, blankets and coverlets, as used in Europe and America; but many people, for comfort and protection against the elements, use different kinds of beds. Some sleep in caves, some on the bare ground and others within or on the skins and furs of animals. The Chinese and Japanese use matting and rugs for their beds. In warm climates where insects and mosquitoes are prevalent, a canopy of light-netted, washable goods is used to surround the bedstead to protect the sleeper. In Arctic regions the people sleep in bags made of furs to guard against cold.

Bedbug, a family of annoying insects of the order Hemiptera. Members of the family may be recognized in having the head shorter than the thorax; the last segment of the feet undivided and bearing claws at the tip; the body short, broad and flat on top; and the proboscis and the feet of three joints each. They are reddish-brown in color, and though wingless are exceedingly widespread. Because of their flat bodies they can conceal themselves in small cracks into which they run with great swiftness. Bedbugs are generally nocturnal; their bite is poisonous and very painful.

Late investigations have shown that bedbugs transmit plague, relapsing fever and other diseases. To rid the house of the pests, the furniture, especially the beds, should be gone over with a quill dipped in a saturated solution of corrosive sublimate in alcohol. This solution is, however, extremely poisonous and should be handled with care. Gasoline, benzine and kerosene are also efficacious. Red ants and cockroaches prey upon bedbugs, but, unfortunately, are almost as great pests as the bugs themselves.

Bede, *Beed,* or **Bæda,** *Be'da* (672 or 673-735), English historian and theologian, known as the Venerable Bede. Born in the territory of the Monastery of St. Peter at Wearmouth and of St. Paul at Jarrow, he was educated for the priesthood, entering upon monasterial life when but seven and becoming a priest 23 years later. He was the most learned man of his time and wrote a large number of books, mostly in Latin. His works may be classified as scientific, historical and theological. His chief work, the *Ecclesiastical History of the English People,* is a reliable source of information concerning early English history and has earned for him the title of Father of English History. His last work, the translation of the *Gospel of St. John* into English, has not survived.

Bedford, *Bed' ferd,* **Ind.,** a city and county seat of Lawrence Co., 71 m. n.w. of New Albany and 79 m. n.w. of Louisville, Ky., on the Baltimore & Ohio Southwestern, the Chicago, Indianapolis & Louisville, the Southern Indiana and other railroads. It is situated in a region noted for its extensive quarries of building stone, which under the name of "Bedford stone" is shipped in great quantities over a large extent of territory. The city also contains large railroad shops, roundhouses, veneer mills, cement works and machine shops. Many of the public buildings are fine stone structures. There is a public library. Population in 1920, U. S. Census, 9,076.

Bedouins, *Bed' oo ins,* a division of the Arab race. They call themselves the "dwellers in the open land," or the "people of the tent." They are a wandering people, undersized, shepherds and herdsmen by profession, and, nominally at least, of the Mohammedan faith. They

subsist by plunder and by living on their herds and meager agricultural products. They, together with the North Arabians, refer their ancestry to Ishmael. See ISHMAEL.

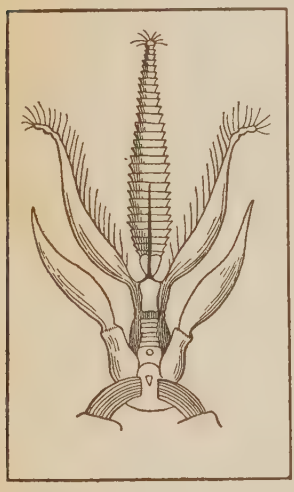
Bee, a widely known and highly interesting family of insects of the order Hymenoptera, a group which also includes the ants and wasps. Although there are many classes of bees among those that are seen commonly over the summer fields, and although they show wide differences of form and structure and even wider differences of habit, the bees are generally classed in one large family.

CLASSIFICATION. For ordinary purposes the familiar bees may be divided into two classes, the solitary bees and the social bees. Those of the first class are not solitary in the sense of living entirely alone, but are called so because they are without any specialization for community life. Such bees are: the mason bees, ingenious pliers of their trade; the carpenter bees, constructers of curious little chambers in wood; the cuckoo bees, robbers of birds and squirrels' nests to secure a place for their waxen cells; and the leaf-cutters, whose scissorlike jaws work great damage to foliage. The life of these bees is not widely different from that of the majority of insects; only the female lives through the winter, finding retirement in a tree cavity or deserted mousehole, which she has previously stored with honey. On the earliest warm spring days she emerges and finds a situation, perhaps in company of others of her kind, where she may build her nest, fill it with honey and deposit her eggs. Many of these bees, having provided food for the helpless days of their offspring, have no further interest in them; others remain near, storing more honey, depositing more eggs and caring for the issuing larvæ (See CARPENTER BEE; MASON BEE). The social bees, a group including the honeybee and the bumblebee, are of higher organization, and with them division of labor has reached an advanced stage.

HONEYBEE. These bees live in colonies of from 10,000 to 80,000 individuals which are of three castes: the queen, who is queen in name only and is not, as was once supposed, the ruler of the hive; the workers, most aptly named; and the drones. The queen is the mother of the hive, and about her and the thousands of eggs which she produces center the interest and activity of the colony. Should she be killed or her fertility destroyed at a time when another queen could not be provided, the hive would speedily become disorganized. The workers are also females but of a degenerate type, built for labor, with their keen eyes, "honey crops," pollen baskets and stout, shortened bodies. Upon them devolves the labor of providing food, caring for the queen and her larvæ, feeding the burly drones and rarely producing eggs, which eggs strangely enough, are capable of hatching only drones. The drones are the males; their name refers to their booming song, and, although the term has become one of reproach, the drones serve their purpose in the hive and are as necessary to its continuance as are the queen and the workers. The queen may be recognized by her long, narrow abdomen of six segments; the workers, by their smaller size and their four segments; the drones by their rollicking heedless ways and their big bodies terminating by a tuft of hairs.

Structure. Like all insects, the bees have two pairs of wings and segmented bodies, plainly divided into head, thorax and abdomen. There are, however, several marked peculiarities about their structure, especially among the workers. The tongue is a hollow organ of longer or shorter extent but capable of protrusion until it can reach the depths of the nectar cups of flowers and suck their store of sweets. The length of a bee's tongue determines the flowers from which it shall sip the honey-making nectar, and this accounts for the fact that one kind of bee haunts one field while another forages in an adjacent one. Another notable feature of the bee's anatomy is its tiny crop, in which the nectar

is stored as the industrious worker flits from one flower to another or flies in a "bee-line" for the hive. From the crop, the nectar, which is mixed with saliva and so undergoes a slight chemical change, is cast out into the storage cells or into the brood cells, where it is to provide nourishment either for the hive during the flowerless winter time or for the helpless larvæ just issuing from the egg. In this form it is the honey of commerce, and is taken by man for the market from the storage cells (See HONEY).



TONGUE AND MOUTH OF HONEYBEE

The legs of the workers, as has been noted, are of special structure. A hollow of the thigh, surrounded by bristly hairs, serves as a pollen basket to collect the other offering of the flowers. If bees are watched carefully as they come in from the field, it will be seen that one carries yellow pollen, another red, another brown and perhaps another the black of the poppy beds. Each bee collects during one trip only one kind of pollen, and if the first visit was made to the golden dandelion, no other kind of flower will be entered until, with laden baskets, the bee has returned to the hive and emptied its store.

Perhaps the best known and least appreciated part of the bee's anatomy is the sting, located at the extremity of the abdomen of the females, queen or workers. It is a curved, barbed sword incased in a sheath, whose sharpened point starts the wound. If the finest needle be examined under a compound microscope its seemingly polished surface would have the appearance of a roughly-wrought bar; the sting of the bee so viewed, however, shows a perfectly smooth surface, tapering to an almost invisible point. The muscles which control it are scarcely to be seen with the naked eye, and yet they act with a power sufficient to drive the point one-twelfth of an inch into a person's hand. Accompanied by a flow of poison and hindered in withdrawal by the backward pointing barbs, the sting makes a hot, painful wound. It may be some satisfaction to know, when one has been so wounded, that no doubt that bee will never again use its weapon, which is apt to be left in the wound, or that it may even die from the effects of its own vengeance. The sting has, however, been the means of saving the bee race from destruction, for otherwise its nectar-filled crop and pollen-laden baskets would make it a tempting prey to birds and carnivorous insects.

The Life of the Bee. Perhaps the life of the bee may be best understood by tracing a hive through one summer of its existence. The honeybee has so long been domesticated that its habits have become well known. During the winter the hive is comparatively inactive and silent. A group of workers with the queen in their midst is quietly and assiduously feeding upon the stored honey. In the darkness of the hive there is little of the bustle which the warm sunshine of spring will awaken. On a bright day the bees may issue for a brief flight, but they are soon back to the hive, whose temperature is kept high by the heat of the thousands of little, warm bodies. As the winter draws near its close, the bees feed more and more slowly, lest a long-delayed spring find them without food before the earliest nectar-bearing flowers bloom. But one day the breath of spring enters; there is a restless stir among the occupants, and some of the number go out as scouts. The queen begins laying again, and soon each little worker flies to its task with a zeal that implies a knowledge that its time for work is brief.

The division of labor is that of a well-organized city. As the larvæ develop in the cells, some high authority, which

BEES

Worker
Honeybees and White Clover

Queen
Colony
Butterflies

Drone
Bumblebees and Red Clover

Maeterlinck calls the "spirit of the hive," separates one group to act as nurses to feed the larvæ or tend the awakening pupæ; eight or more become ladies-in-waiting to the queen or, less poetically but more truly, an imprisoning guard which surrounds her and directs her to the cell into which they decree the eggs shall be deposited. In the small, hexagonal cells, the first-laid eggs are placed, for these are to hatch into workers, badly needed in the early summer; into the larger cells go the unfertilized eggs that are to develop into drones, and in the royal chambers of largest size and broad, acornlike form, placed where the ventilation is best, are the eggs from which princesses shall hatch. There is no difference between the egg that is to hatch into the worker and that which is to produce a queen, but superior feeding, better cell accommodations and perhaps other yet unknown agents cause a divergence in the development, which produces the different castes. Meantime other workers ventilate the hive by standing in an open row before the one, low entrance, fanning the impure air out and the pure air in; the capsule makers are sealing the honey cells, into which another band has just dropped, from their stings, enough formic acid to preserve the honey.

The sanitary brigade keeps the hive in a state of cleanliness by continually removing any stray leaves, broken comb or dust that may have found entrance. Members of another group bear out high above their heads the bodies of dead comrades or larvæ which failed to develop: at the door stands a faithful guard which examines the qualifications of all incomers and forcibly bars out bees from other hives or marauding insects. Outside, another group helps in the weary, overburdened forager of the field, cleans the wings of the novice before he makes his flight, and, when not needed elsewhere, clears out a cell from which a bee has emerged and makes it ready for the reception of another egg. One other group, whose labor will be spoken of again, hangs from the top of the hive in a living but motionless curtain, secreting from the "wax pockets" tiny scales of wax to build the comb. In the dark and silence of the hive the work that they do cannot be accurately known, but it is understood that in the four pairs of wax pockets located upon the abdomen of the worker, little hexagonal sheets of wax begin to form, which are either removed by other workers, dropped to the floor of the hive or taken, by the one which secreted them, to the place where they are needed to build the wall. Each is mixed with a little moistening saliva, set in place by one bee, patted by the next, molded by another, pressed thinner by a third and so worked over until it takes the hexagonal form of a worker cell.

As the days go by the eggs in the cells have developed into larvæ, which must be fed with honey and bee bread, a mixture of nectar and pollen. When the larva has reached its highest development, or in about five days, it spins itself a thin cocoon and spends eight days in a motionless, pupal state, sealed in by the capsule makers. At the end of this time it is ready to issue, and to take its place in the busy affairs of the city. It generally spends some time trying its powers, clearing away the remains of its cell wax and investigating its surroundings before it flies to the honey cells to break its week of fasting. If a worker, it performs duties within the hive for two weeks or more before being sent out as a forager; if a drone, it is fed by the workers and emerges at will to the sunshine for a heedless, purposeless frolic in the fields. The princesses, however, are watched more carefully; as they mature, the cells are walled up from the outside as rapidly as they tear them down from within, since the old queen can barely endure the presence of a rival even though that rival be her own daughter.

Swarming. But suddenly the mysterious spirit of the hive decrees that the old queen and fully three-fourths of the population of the teeming hive shall go forth from the wealthy city to make room for the yet unborn generations.

A strange excitement pervades the air, and the majority of the bees desert their accustomed tasks. No foragers go forth, and a suppressed, unusual humming is constantly to be heard. Then, as though at a given signal, the queen mother, surrounded by the main body of her followers, leaves the hive never to return. This swarming, as the exodus is called, occurs in the spring, though it is not now desired by bee men as early as formerly. The swarm circles high in the air, and after a brief flight settles slowly in an almost motionless mass upon the limb of a tree or some other suitable projection. Here it remains until returning scouts have located a new home, or until the skilled keeper has enticed them into an empty hive.

The New Queen. During this time the old hive has been the scene of changes. An emerging princess has been allowed to break through the door of wax that closed her cell. For several days she is apparently unnoticed by the busy workers and the idle drones; she feeds herself, tests her wings and walks about the hive. She may even leave it for short flights, but neither her presence nor absence causes a stir. Suddenly a new impulse seizes her, and after a circling flight above the hive she flies straight up into the sunshine. A drone from some near-by clover field sees and follows; then another and another. Somewhere, generally high in the air, the mating takes place, and the young queen returns after less than an hour's flight, seldom again to leave the hive. The drone who has been her mate, having accomplished his purpose in life, dies in the same hour. Once back in the hive, the queen meets with a joyful reception; her body guard surrounds her, workers clean her wings and feed her, and the whole hive takes on an air of excitement. As soon as her egg laying begins, she is allowed a brief moment of respite in which to follow her desire for battle against her helpless sister queens still sleeping in their cells. These she puts to the sword without mercy, and then free, for the time being, from fear of rivalry, she continues her duties of egg laying. On the approach of winter the drones, having fulfilled their office, are stung to death by the workers.

Age. The bee's life is of comparatively short duration. The workers, with the exception of those that pass the winter resting, rarely live more than six weeks, so that those which waken to the sunshine of spring are not the ones that are found in the hive in the fall. The males live through but one season; the queens, the longest-lived of the race, may live for five years, but are rarely actively fertile for more than three years. So the hive, continuous in activity and unceasing in its labors, is really a constantly changing community in which "the spirit of the hive" is the only unchangeable factor.

Bumblebee. The life of the bumblebee, the undomesticated social bee, is much the same, though its wild state has led to some differences of habit. The queen alone lives through the winter, and begins immediately building cells for the storage of eggs and honey. From these earliest-laid eggs hatch the workers, which at once assist in the labors of cell building and food collecting. The nest is generally made in a hollow tree or under the ground, and the stored honey, which is the prized spoil of the boy, is of strong flavor and of not unmixed cleanliness.

Bees and Flowers. Aside from their value as food producers, the bees are of inestimable use to man in the fertilization of flowers. Many blossoms are so constructed that the stamens, which produce the pollen, develop at a different time from the pistil which is to bear the seed. The object of this is that the pollen from a different flower may fall upon the pistil. Such flowers depend chiefly upon the wind, the bees and the birds for fertilization. To attract the bees, the flowers have deeply-hidden nectar cups so far down in their depths that to reach them the bee must practically enter the flower. As the hairy legs brush the stamens in passing, they catch numerous particles of the pollen which they bear to the next flower, there to brush it off

on the elongated pistil. The methods used by flowers to entice the bees to perform this office for them are varied and interesting (See CROSS-FERTILIZATION). The particular case of greatest benefit to man is the fertilization of the red clover, a task always performed by the big bumblebee, without which the red clover would not develop seed. The introduction of this clover into Australia proved a failure until the helpful bee was also introduced. In killing a bumblebee whose sting is feared, a valued assistant is being poorly paid for its labors in man's behalf. The honeybee, though more erratic in its tastes, finds equal opportunity to aid man in the fertilization of the white clover.

BEEKEEPING, OR APICULTURE. The science of beekeeping is among the oldest of agricultural industries. Until recent years, however, the beekeeper has contented himself with some 10 or 20 hives, with an average of 20 or 25 lb. of honey per hive annually. Many far-larger apiaries are now established, the largest in the United States being located in California and maintaining from 2000 to 3000 hives and harvesting annually from 150,000 to 200,000 lb. of honey. Naturally, with the increased size of the apiaries, changes and improvement have come about in the appliances used. The old skep hive has given way to the more practical, boxlike hives with movable frames. See Study Guides.

To take up the raising of bees as an industry, a thorough knowledge of the habits of the bees should be gained through a study of practical texts or pamphlets. These are easy to obtain since the subject has been written upon voluminously. Some of the standard books for consultation are: Cowan, *The Honeybee, its Natural History, Anatomy and Physiology; Longstrath on the Honeybee,* revised by Dadant and Son; Root, *The A B C of Bee Culture;* Cheshire, *Bees and Bee-keeping;* A. J. Cook, *The Manual of the Apiary;* S. Simmins, *A Modern Bee Farm;* Webster, *The Book of Bee-keeping.* For a sympathetic and highly enjoyable discussion of the bee, no better book can be read than Maeterlinck's *Life of the Bee.*

Beech, a beautiful and useful tree of the Beech Family, found widely distributed throughout eastern North America, where whole forests are made up of this single class. It is a straight, tall tree often reaching to a height of 100 to 120 ft. The bark is smooth and gray and the cylindrical trunk is from three to four feet in diameter. When allowed to grow freely, its branches divide and subdivide, becoming beautifully symmetrical in form. About its base, sturdy saplings are apt to be found, and in case of the destruction of the parent tree, the ablest of the younger growth takes its place. The leaves are short-stemmed and smooth, with rounded bases, pointed apexes and finely-toothed margins. They turn bright yellow in the autumn and are noticeable from the fact that the veins usually turn first. The flowers appear soon after the leaves are out and are of two kinds. Those that bear the fertilizing dust are found in nodding, spherical heads; each flower has a divided, tubular calyx and from 8 to 16 stamens. Those which are to bear the fruit are in small clusters in the axils of the leaves.

The fruit is a bur which ripens in autumn, opening to discharge its two three-cornered nuts, but then remaining upon the branch through the winter. The meat of the nut is oily and sweet and in some localities is used as a food, but chiefly it is sought by the squirrels or by the swine which root for the nuts beneath the fallen leaves. The twigs of the beech are slender, and in winter the trees may be known by their glossy, brown bark and long, pointed winter buds. The wood is hard and close-grained but not exceedingly durable. It is used for fuel and in the manufacture of chairs, handles for tools and other implements.

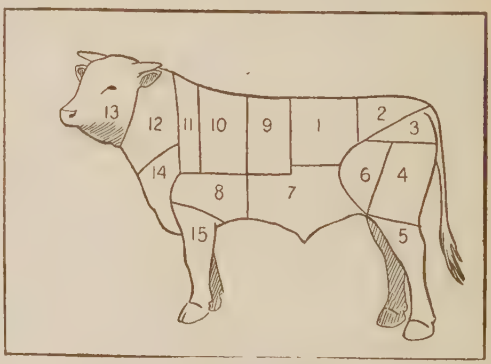
Beech'er, Henry Ward (1813-1887), an American clergyman, author and lecturer, third son of Dr. Lyman Beecher, born in Litchfield, Conn. He was educated at the Boston Latin School, Amherst College and Lane Theological

Seminary. He had pastorates of Presbyterian churches in Lawrenceburg, Ind., 1837-1839; in Indianapolis, Ind., 1839-1847; and in Brooklyn, N. Y., 1847 until his death. Mr. Beecher was a reformer from the beginning of his work, being connected with an anti-slavery paper while in his first pastorate. Yet Mr. Beecher did not then, or later, advocate interference with slavery in the states where it was already established, but rather he advocated its gradual extinction by constitutional prohibition of its extension. In 1863 Mr. Beecher delivered a number of lectures in England, facing and quieting several mobs; and by sheer force of his keen argument and wonderful personality, was instrumental in turning the sympathies of England from the South to the North regarding the issues of the Civil War. The great Plymouth Church in Brooklyn nobly supported his labors for 40 years, during which time his influence was widely felt for good, both in this country and abroad, not only in matters of religion, but in every great reform and in the social and political world. He was an orator of tremendous power, calling both wit and pathos to the enforcement of his thought. He was a frequent contributor to the *Independent,* and was for several years editor of the *Christian Union.* Among his works are *Norwood,* a novel; *Lectures to Young Men;* and a *Circuit of the Continent.*

Beecher, Lyman (1775-1863), an American clergyman, theologian and author, born in New Haven, Conn. After graduating at Yale College in 1797, he began to preach, becoming pastor of the Litchfield, Conn., Congregational Church in 1810, and of Hanover Street Church, Boston, in 1826. He was president of Lane Theological Seminary, Cincinnati, Ohio, 1832-1851, during the first ten years of which period he was also pastor of the Second Presbyterian Church of that city. In connection with the presidency, Dr. Beecher occupied the chair of theology in the seminary. When the Presbyterian Church separated he joined the New School branch. He spent the last years of his life in literary work, living in the home of his son, Henry Ward Beecher. He was the father of Harriet Beecher Stowe. His most notable works are *Remedy for Dueling, Views on Theology* and *Sermons on Temperance.*

Bee-Eater Family, birds related to the kingfishers, living in Europe, Asia and Africa. There are about 40 species, of which the common bee-eater is the best known. It is about the size of the robin and is colored blue, green, yellow, chestnut and black. The bill is long and curved, and the wings are long and slender. The nest is made in a burrow, which is excavated in a bank or in the ground. Three to five white, glossy eggs are laid. The bee-eaters fly like swallows and catch their food, which consists of bees and other insects, while on the wing.

Beef, the flesh of domestic cattle, like that of the cow or ox. It is the most nutritious of all meats, and is eaten by people in all civilized countries. After slaughtering and dressing the animal, the carcass is divided along the back into halves; it is then divided into quarters, in which form most of the beef reaches the dealers and retail butchers. A beef-



CUTS OF BEEF

steak is named from that part of the animal from which it is cut, as rib steak from off the ribs, sirloin steak from under the loin of the animal, round steak from the round part of the hind leg, and rump from the rump, or upper hind leg.

The illustration shows the cuts into which the carcass is usually divided by

dealers: 1, sirloin; 2, rump; 3, aitchbone; 4, buttock; 5, leg; 6, flank; 7, thin flank; 8, brisket; 9, prime rib; 10, middle rib; 11, chuck; 12, neck; 13, head; 14, clod; 15, shin. Other cuts are named in a similar manner. In roasting, beef loses 20 per cent of its weight, and in boiling, 30 per cent. When fresh and raw, it contains 50 per cent of water. It is sometimes eaten raw, finely cut up and smeared on bread, and in this condition is often prescribed for invalids. It contains its greatest nourishment when fresh, and only the best quality of beef should be sold as fresh meat. Its color, when fresh and the animal healthy, is a bright red, with the fat a pale yellow.

Beef is preserved by drying, salting and canning. Salted beef is known as corn beef. Cattle raising, beef producing and beef packing are important industries in the United States and Canada. In yearly production, the United States leads, with over 5,000,000 tons; Russia comes next with about half as much; Germany with about 1,000,000 tons; Austria-Hungary, France and Great Britain with about 750,000 tons each; Australia with about 333,000 tons; and Italy with nearly 300,000 tons. The total world's production is about 10,000,000 tons a year. See CATTLE; MEAT PACKING.

Beef, Extract of, a liquid preparation of beef extensively used for making several kinds of soup, broth and beef tea. The extract is prepared by extracting the juices from the meat, then evaporating the water from them. The juices are extracted by placing the meat in large kettles holding about 2000 lb. each and having dome-shaped covers. The lower half of the kettle is surrounded by a water jacket, in which water is heated to a high temperature. After evaporation the extract is mixed thoroughly to give it a uniform consistency, then put up in small jars or dried in cubes, which dissolve readily in hot water.

Beelzebub, *Be el' ze bub,* the name by which Baal, god of the people of Ekron, in Philistia, was worshiped. In the New Testament he is spoken of as chief of the demons, under the names Beelzebub and Beelzebul.

Bee Martin. See KINGBIRD.

Beer, a name generally applied to any malt liquor. It is a beverage prepared by means of fermentation from malt, hops and water, and contains from three to five per cent of alcohol. Malt is properly made of barley. In England the term *beer* is applied to ale. In the United States and on the Continent of Europe the name *lager beer* generally is used for it. *Lager* is from the German, meaning storehouse, and is given to this beer because it is kept in a storehouse to cure it. Porter is a dark-colored beer, made by adding dark brown malt, and contains more alcohol than beer. Stout is a strong porter. See ALE; BREWING.

Bees'wax", wax secreted by bees for the building of the comb (See BEE). It is prepared for commercial use by boiling the comb and skimming off the wax which rises to the surface. The wax thus secured is of yellowish-brown color because of the impurities which it contains; to be made ready for the market it is remelted, filtered and bleached. Beeswax is used in the preparation of medicines, cements and ointments and in the manufacture of candles; in small quantities it is used to smooth the roughness of thread and of flatirons. See WAX.

Beet, a plant of the Goosefoot Family, whose thick, fleshy roots are of great commercial importance. It is a native of Asia where it still grows wild, but the variety there known would hardly be recognized as a relative of the sweet, succulent beetroot familiar in the United States. In the East the beet was first cultivated for its leaves and stems, which for 2000 years have been used as greens. By a long system of cultivation the numerous varieties now common have been produced. The beet is naturally a biennial, that is, it lives for two years. The first year it collects and stores in its roots the rich nourishing juices which are to go the second year to the making of flowers and seed. If allowed to stay in the ground, the seed is formed but the

root becomes thin and withered and the plant dies.

The coarser varieties of beets are known as mangels or mangel-wurzels and are raised chiefly as fodder for stock; the roots are generally white. Most varieties have deep red roots; in fact the word *beet* comes from a Celtic word meaning red.

Sugar Beet. By far the most important of the varieties of beets is the sugar beet, which is now widely used in the manufacture of sugar. As early as 1590 the root of the beet was known to contain sugar and was used to produce sirup, but until 1747 was not considered as a source of commercial supply. At that time, however, a German scientist recommended its use and showed in his laboratory how the sugar could be extracted. As an industry, the manufacture of beet sugar was not taken up seriously until 1835. Since then Germany has given especial attention to the raising of sugar beets, and the United States, where sugar has been made from the beets since 1830, has, since the Civil War, been also extensively engaged in their cultivation.

Beets are readily grown in temperate climates. The soil should be deeply plowed and well harrowed and kept free from weeds; the process is not difficult since from the nature of the plant much may be done by steam plows and other mechanical devices. The sowing is done from seed and is accomplished by means of sowing machines, which drop the seed into light furrows about one foot apart. When the plants first appear, weeding is done by hand, as the leaves and stalks are exceedingly tender. As the plants grow, they are thinned out by killing intermediate plants but leaving them in the ground to enrich the soil. The influence of light is injurious to the roots, so the fields are constantly gone over and the soil drawn up over any exposed root tops.

Harvest time is in September or November, according to the climate, but is generally as late as possible and depends greatly upon the demand at the factories. The leaves are left on the field to fertilize it and the roots are taken at once to the factory. In the United States, Colorado, California and Michigan lead in the production of sugar beets. See Sugar, and Study Guides.

Beethoven, *vahn Ba' to ven,* **Ludwig Van** (1770-1827), the German musical composer, was born at Bonn, the son of a tenor singer in the chapel of the Elector of Cologne. While never a precocious genius, such as Mozart, the boy, urged by a mercenary father, who is said to have "beat music into his son," displayed at an early age considerable skill as a performer and impersonator. Among his teachers were Mozart, Haydn and other celebrated contemporaries; but his great triumph was due not so much to this tutelage as to indefatigable industry and perseverance. At the age of 22 Beethoven removed to Vienna, then the musical center of Europe, where the remainder of his life was to be spent. Here he found his way into aristocratic circles and gained thereby the patronage which in that day was necessary for the support of art. At about the age of 30 Beethoven began to grow deaf, and by middle age all sense of hearing was gone. Thus afflicted, and harassed by distressing family affairs, his life was anything but a happy one. But his sufferings were borne with patience and noble fortitude. He was never married.

Beethoven's compositions, begun when the composer was ten years of age, include nine symphonies, several concertos, sonatas for piano and for violin and piano, one opera (*Fidelio*), an oratario (*The Mount of Olives*), string quartettes, masses and songs. Beginning in the footsteps of his predecessors, Beethoven, although creating no entirely new musical forms, gradually introduced numerous changes and added innumerable refinements to the old. He evolved the modern scherzo movement from the earlier minuet, invented new constructions of the coda and finale, introduced novel connecting phrases in symphonies and made freer use of keys in modulations. His greatest gift to music, however, lies in the emotional warmth with which he enriched the sonata and the

symphony and widened the scope of the orchestra, revealing orchestral possibilities before undreamed of. With him the Classical School reached its highest development. His compositions perfectly mirror their composer's intellectual poise, stability of character, and high ideals. They are the supreme test of musicians, requiring for their performance rare intellectual and temperamental gifts and a high degree of technical skill. In range of musical ideas, depth of thought and feeling, unerring sense of beauty and perfection of form Beethoven has no superior, if an equal; and as long as sane musical ideals survive he will occupy the place of highest honor in the estimation of the initiated.

Beet'le. See COLEOPTERA, *Kol"e op'ter a.*

Bégin, Louis Nazaire (1840-), a Roman Catholic prelate, born in the Province of Quebec. After advanced theological study at Rome and at Innsbruck, he became professor of dogmatic theology and ecclesiastical history at Laval University, principal of the Laval Normal School, Quebec, and in 1898, Archbishop of Quebec. The following year he was invested with the palladium. Archbishop Bégin has traveled widely and has written on religious subjects.

Bego'nia, a class of herbs or shrubby house plants of the Begonia Family, named for a certain Captain Begon who was governor of Santo Domingo nearly 300 years ago. Ordinary begonias rarely grow beyond the house-plant size, but in conservatories immense plants have been produced which astonish those who are unfamiliar with their possibilities of growth. One of the most striking characteristics of this class of plants is their unequally-sided leaves shaped much like the ear of an elephant, and for this reason the begonia is frequently spoken of as "elephant's ear." In texture the leaf is thin, having a shining, green upper-surface and a light or reddish, dull under-surface. The edges are toothed, waved or entire. One of the peculiarities of the begonia, frequently made use of, is the readiness by which the leaves, if cut and placed in a moist situation, will put forth roots and thus propagate new species. These leaves and their stems are often beautifully colored and are themselves as handsome and as brilliant as blossoms. The blossoms of the begonia, however, are generally showy. The calyx and corolla are generally colored the same and are much alike in form. As in many of our conservatory plants, the clusters bear two kinds of flowers: staminate, or those containing the stamens; and the pistillate, or those which are to produce seeds. In many begonias the flowers hang on slender, drooping stems like bits of coral on a necklace; in others the blossoms are upon stiff, erect stalks. In color they vary greatly but are generally in shades of red, from the daintiest pink to the most flaming crimson or in fascinating combinations of these.

Behemoth, *Be' he moth,* an animal described in *Job xl,* supposed to be the elephant or hippopotamus. The word is apparently of Egyptian origin, signifying water ox.

Belasco, David (1859-), an American playwright and stage manager, born in San Francisco, Cal. He first appeared as an actor at the Metropolitan Theater in 1874. After being stage manager of the Madison Square Theater, New York City, and of the Lyceum Theater, he became owner and manager of the Belasco and the Republic theaters in New York. He has written, alone or in collaboration, *The Wife, The Charity Ball, Lord Chumley, The Girl I Left Behind Me, The Heart of Maryland, Zaza, La Belle Russe, Du Barry* and *The Girl of the Golden West.* He also dramatized Long's story, *Madame Butterfly.*

Bel'fast, a seaport of Ireland, the capital of the Province of Ulster, situated on the Lagan River, about 112 m. n. of Dublin by rail. The chief buildings are Queen's University, the Presbyterian and Methodist colleges, the city hall, the Theater Royal and several churches. The harbor, with its extensive improvements

in the form of modern docks, is one of the largest in the United Kingdom, and Belfast is an important distributing port. Its shipbuilding industry is immense; it is the center of the Irish linen trade and has some of the largest rope works and tobacco works in the world. Other industries are flax spinning and weaving, distilling and the manufacture of mineral waters. Following the introduction of cotton manufacture in 1777 and the establishment of shipbuilding on an extensive scale in 1791, the commercial growth of the city has been very rapid, and it is now the second city of Ireland in population and first in trade and manufactures. Population 400,000.

Belgium, *Bel' ji um,* one of the smallest of the European states, bounded on the n. by Netherlands, on the e. by Prussia and Luxemburg, on the s. by France and on the w. by France and the North Sea. The total area is 11,373 sq. m., or a little less than that of Maryland.

Surface and Climate. The country is in the main level and low-lying, except in the southeast, where the Ardennes rises to an altitude of 2200 ft. Much of the territory in and surrounding Flanders is redeemed from the inroads of the sea only by means of canals and dikes. The principal rivers are the Schelde and the Meuse, both of which rise in France; their tributaries include the Lys, Rupel, Dender, Sambre, Lesse and Ourthe. A system of navigable waterways extending 1400 m. is maintained. The climate of Belgium does not differ greatly from that of Great Britain, except that the winters are more severe and the summers are hotter, while that of the plains is generally equable and humid.

Mining and Agriculture. The coal deposits of Belgium constitute the chief mineral supply and form the principal source of the prosperity of the country. Other minerals are iron, copper, zinc, lead, alum, calamine, slate, limestone, peat and marble. The agricultural interests of Belgium are subordinate to its mining and manufactures. Whatever agriculture is carried on, however, is controlled in each province by a government agricultural board, and a high state of perfection in methods is maintained. The vine is extensively cultivated, chiefly along the Maas River. The cereals grown are oats, wheat, barley, spelt and buckwheat. Beets are cultivated for sugar, and tobacco, hemp, rape, hops, flax and chicory are grown. Stock raising and the dairy industry are important; the Belgian cheese, especially that of Limburg, enjoys a wide reputation. There are forests in the provinces of Liège, Luxemburg and Namur, but not sufficient to supply the demand for wood which the Belgian industries require. Fishing employs a few thousand people along the coast, and the catch approaches annually about $1,000,000 in value.

Manufactures, Commerce and Transportation. The manufactures of the country are of two types, those carried on by means of modern methods of machinery and those represented by the smaller, handmade manufactures. The textile industry consists of the manufacture of linen, woolens and cotton. The Brussels and Bruges lace is among the most expensive in the world; the Brussels and Tournay carpets are likewise famous. There are large ironworks near the extensive coal and iron-ore deposits in the southern part, and machinery of all kinds is manufactured. Gold and silver goods are manufactured at Ghent, and the glassworks, chiefly at Hainaut, Namur and Brabant, lead the world in the delicacy and beauty of their wares. Among the other industries are printing and manufacture of hides, leather, chemicals, woodwork, lumber, tobacco and food products. There are over 100 sugar factories that yield a large output of sugar annually. The railway mileage of Belgium is greater in proportion to the area than is that of any other country. It is almost wholly within government control. The inland waterway system is complete and extends to all important towns. Altogether there are 1370 m. of navigable waters (one-half of which is canals), and they float a heavy commerce, for the country maintains a flourishing merchant marine.

The imports required in exchange for the manufactures consist chiefly of food products and raw materials. Germany, France, Great Britain, Netherlands, the United States, Russia and Argentina are the chief countries with which trade is carried on.

INHABITANTS. The average population of Belgium is about 600 per square mile, making it the most densely populated country of the Continent. The inhabitants belong to two distinct groups: the descendants of the Celts and Germans, coming from the north, and a darker race from the south thought to have descended from the ancient Belgæ. Both French and Flemish are spoken in the south, and each language gives a name to all the geographical places in the country; this accounts for the fact that all possess two names.

GOVERNMENT AND RELIGION. The government of Belgium is described as a "constitutional, representative and hereditary monarchy," and is based on the constitution of 1831. The crown is hereditary in the direct male line, and upon failure of male issue the monarch in agreement with the chambers decides upon his successor. The king rules through a council of ministers who are responsible to the chambers. There are eight departments of state: finance and public works, interior and public instruction, foreign affairs, justice, war, agriculture, industry and labor, railways, posts and telegraphs. The chambers consist of the Senate and a Chamber of Deputies. The Senate is composed of 110 members, 83 of whom are elected by direct suffrage and 26 by the provincial councils; the Chamber of Deputies numbers about 166, and is elected by direct suffrage. Local government is in the hands of the governors—one for each province into which the country is divided; smaller units of local government are the arrondissements, cantons and communes. All religions are tolerated and there is no State Church; the State contributes a small support to the ecclesiastical orders, and gains most of its own material support from the people. The principal religion is the Roman Catholic; there are about 10,000 Protestants and 4000 Jews.

EDUCATION. Secular educational institutions are supported by the government, and among the state universities are those at Ghent and Liège; free instruction is provided at Brussels and Louvain. There are also technical and industrial schools, a Royal Academy of Fine Arts at Antwerp, and schools of music and design. Primary education is in the hands of the commune; the high schools and the royal athenæums (secondary schools) are supported and controlled by the government.

CHIEF CITIES. The principal cities are Brussels (the capital), Antwerp, Ghent, Bruges, Liège and Ostend.

HISTORY. The history of Belgium begins when the ten southern provinces of Netherlands returned to their Spanish allegiance during the rebellion against Philip II (See NETHERLANDS, subhead *History*). A strip of the country was taken by Louis XIV, and the whole of it given to the Austrians by the Treaty of Utrecht (1713). The French troops poured over its borders during the French Revolution, and by 1795 the people had voted to make the country a part of France. After the Congress of Vienna (1815), Belgium was made a part of Holland, very much against its will. In 1830 the Belgians rebelled against Holland and became an independent kingdom. Leopold of Coburg accepted the throne, and with the help of England and France the kingdom was established. In 1832 the powers guaranteed the neutrality of Belgium. No change was made in the constitution for about 50 years, but, owing to popular discontent, the present franchise law was passed, giving one vote to each man, and adding votes to men of wealth and education.

Leopold II succeeded his father in 1865. He developed the country industrially, and in 1885 he aided Stanley in his explorations of central Africa. By the Congo International Congress Belgium was given the chief power in the Congo Free State, which, in 1908, was

annexed under the name Congo State (See Congo State). Albert I, nephew of Leopold II, succeeded him in 1909. He married Princess Elizabeth of Bavaria.

The history of Belgium during the European War, 1914, is an exceedingly sad account. The background is a blood-stained cruel account of murder, pillage and rapine; the foreground is a record of heroic sacrifice, of vain endeavors to stay the menacing rush of a people that had promised by treaty to defend her neutrality. The civilized world will never forget the merciless sack of Louvain nor the agony of a nation forced into slavery. Surely a better day is approaching when the remnant of surviving Belgium will build again her towns and cities and the peaceful scenes of a free progressive nation, made secure in her ancient rights, shall again greet the traveler in Belgium. (See Albert I: "European War"). Population, 7,516,730.

Bel"grade', the capital of Servia, situated on a triangular ridge at the confluence of the Danube and the Save. The chief buildings are the king's palace, the National Theater, the Royal Servian Academy of Science and the National Library. The industries of the city are not highly developed, because of a scarcity of labor and capital; they include the manufacture of carpets, hardware, saddlery, preserved meat, confectionery and silk stuffs. Belgrade was taken by the Austro-Bulgarian forces in November 1915. The seat of government was then established at Corfu. Population before the World War about 90,000.

Belisarius, *Bel" i sa' ri us* (about 505-565), a courageous Byzantine general of the Emperor Justinian. He first gained renown in 530 by defeating a large Persian army, and later rendered valuable service to Justinian by putting down a rebellion at Constantinople. In 534 he subdued the Vandals in the Province of Africa, and conquered Sardinia and the Balearic Isles, and in 535 was invested with the dignity of consul. The same year Justinian sent him to wrest Italy from the Ostrogoths, but he was recalled before he could complete his conquest of them. A later expedition failed because of lack of reinforcements, and in 548 he gave up his command to his rival, Narses.

Belize, *Bel zee'*. See British Honduras.

Bell, a hollow cup-shaped vessel made of metal and capable, when struck, of giving forth sound. Bells are of various sizes, varying from those that weigh several tons to tiny affairs weighing less than an ounce. Large bells, used on churches or other public buildings, have an outside attachment at the top by means of which the bell is attached to the axle upon which it swings or rotates. The motion is usually imparted by pulling a rope that it attached to the rim of a large wheel fastened to the axle. The tongue or clapper is suspended at the top of the bell and strikes the sides when the bell swings. A striker is put on the outside when the bell is not swung or rotated. The ancient Egyptians, Hebrews and Grecians speak of bells, and used them in their religious services, as hand bells and cymbals.

The material used chiefly in bells consists of a kind of bronze or alloy of tin, copper and zinc, to which silver is sometimes added to produce a finer tone. Bells were introduced into Christian churches about 400; in France and Great Britain, about 530. The oldest bells are now in Great Britain, known as the Bell of St. Patrick's Will, in Ireland, and the Bell of St. Ninians. These were made before the art of casting bells was known, and are composed of thin metal plates riveted together, and are four-sided in shape. The Great Bell of Moscow, in Russia, and the Liberty Bell of Philadelphia are both famous; one for its great size, being the largest in the world, 21 ft. in height and weighing 193 tons; the other for having celebrated in 1776 the announcement of the Declaration of Independence. Authorities in former times notified the people to retire by the curfew bell. See Alloy; Bronze; Electricity.

Bell, Alexander Graham (1847-), an American scientist, the inventor of the telephone. He was born in Edinburgh, Scotland, was educated in the universities of Edinburgh and London, and then removed to Canada with his father, who was the inventor of a system for teaching deaf-mutes to talk. In 1872 he became professor of vocal physiology in Boston University. In 1876 he patented the telephone, and exhibited it at the Centennial Exposition in Philadelphia, thus gaining immediate fame and laying the foundation of a large fortune. At its 500th anniversary the University of Heidelberg conferred upon him the degree of M. D., for the invention of the *telephone probe,* which facilitates the painless detection of bullets in the human body. He has made other important inventions, including that of the graphophone, and his services have been recognized by the granting of many honorary degrees. To the needs of deaf-mutes, and for their proper training, he has made large gifts of both time and money, and is today recognized as one of the world's foremost authorities on this subject.

Bell, John (1797-1869), an American statesman, was born near Nashville, Tenn. He graduated at Cumberland College (now the University of Nashville) in 1814, studied law and settled at Franklin, Tenn., to practice. He was elected to the State Senate in 1817, and to Congress in 1827, serving until 1841, at which time he entered President Harrison's cabinet as secretary of war. He was speaker of the House from 1835 to 1837. He served in the United States Senate from 1847 to 1859. In 1860 he became the candidate of the Constitutional Union Party for the presidency, with Edward Everett for vice-president, and received the electoral votes of three states. He became an ardent supporter of the protective tariff, opposed the Texas annexation policy, advocated Henry Clay's Compromise of 1850, voted against the Kansas-Nebraska Bill of 1850, and opposed the repeal of the Missouri Compromise. At first he opposed secession in the Civil War, but later he supported the Southern policy.

Bell, Robert (1841-), a scientist, born in Toronto and educated at McGill University. In 1857 he joined the geological survey of Canada and later he made topographical and geological surveys throughout the Dominion. As medical officer, naturalist and geologist, he accompanied the expedition of the *Alert,* in 1885, to Hudson Strait and Bay, ten years later he surveyed the west branch of the Nottaway, which was officially named the Bell River, in 1897 he surveyed the southern coast of Baffinland and from 1906 to 1908 he was chief geologist, when he retired. Besides surveying innumerable rivers, Professor Bell made the first surveys of some of the largest Canadian lakes, including Great Slave, Seul, Osnaburgh, with parts of Winnipeg and Lake of the Woods. In the meantime, he taught chemistry and natural science in Queen's University, Kingston, 1863-1867. He published more than 200 papers on his chosen subject and on folk lore and has identified himself with various scientific bodies and movements.

Bel"ladon'na, a poisonous herb of the Nightshade Family from which the drug, belladonna, is obtained. The plant is slender with pointed, green leaves and tubular, red flowers which are followed by black, shining berries. The whole plant contains a chemical substance called atropine, which makes the juices poisonous; the berries, being attractive in appearance, are an especial source of danger. The drug belladonna, which is used by physicians to allay pain and to dilate the pupils of the eye, is derived from the roots and leaves. Belladonna is sometimes called the deadly nightshade or the poison black cherry.

Bellaire, *Bel air',* **Ohio,** a city of Belmont Co., 137 m. e. of Columbus and 5 m. s. of Wheeling, W. V., on the Ohio River and the Baltimore & Ohio and the Cleveland & Pittsburgh Division of the Pennsylvania Railroad. A fine iron railroad bridge crosses the river at this point. Bellaire is situated in an agricul-

tural region rich in limestone, iron, coal, fire clay and cement. It has important manufactories of iron, steel, glass, galvanized and enameled wares, boilers, farm implements, carriages, stoves and machinery. There are a number of educational institutions. Population in 1920, U. S. Census, 15,061.

Bell Bird, a bird of the Chatterer Family. These birds are about ten inches long. Four species are known, of which two are pure white; one is brownish, with white head and neck; and one is white with black wings. In all but one of the species are one or more peculiar appendages on the head, usually at the base of the upper bill, which are covered with feathers and may be inflated at will. The bell birds are found in Central America south to Brazil. The name is given on account of their loud, clear notes, which are metallic and resemble the tones of a bell. The sound may be heard for a distance of nearly three miles.

Bellefontaine, *Bel fon' tain,* **Ohio,** a city and county seat of Logan Co., 45 m. n.w. of Columbus and 57 m. n.e. of Dayton, on branches of the Cleveland, Cincinnati, Chicago & St. Louis and the Ohio Central railroads. The city occupies the highest elevation in the state and is attractively situated in an agricultural region. It has extensive car shops and other railroad works. There are manufactories of structural iron, carriage bodies, harness, tools, flour, cement and railroad cars. Bellefontaine was settled in 1818. Population in 1920, 9,336.

Belle Isle, *Bel" Ile',* **Strait of,** a channel between Labrador and Newfoundland, the northern entrance from the Atlantic Ocean to the Gulf of St. Lawrence. Its length is about 80 m. and its width from 10 to 15 m. It is the shortest course between England and the St. Lawrence River, but navigation in its waters is not without dangers.

Bellerophon, *Bel ler' o fon,* a gallant warrior whom the King of Lycia, wishing to see dead, sent to kill the Chimæra. Advised by a soothsayer, he spent a night at the altar of Minerva. On awaking he found by his side a golden bridle with which he secured the winged Pegasus. The steed helped him to kill the Chimæra and perform a series of similar tasks. By that time the King saw that Bellerophon was favored with the gods, and gave him his daughter in marriage. Bellerophon later became so presumptuous that he later tried to ride Pegasus to heaven. This so angered Jupiter that he tormented the horse with a gadfly, thus causing him to throw his rider. Blind and halt as a result of his fall, Bellerophon died miserably and alone.

Belleau Woods, a rugged forest section of France to the northwest of Chateau Thierry. The official name of that woods in France now is "Woods of the Marine Brigade," which name was given in honor of the American Marines brigade that won an important victory in the World War in that section June 3-10, 1918, completing their victory at Chateau Thierry a few days earlier. While not one of the major battles of the war, the victory was of vast importance since the result was to definitely stay the advance of the Germans on Paris.

Belleville, Ill., a city and county seat of St. Clair Co., 17 m. s.e. of St. Louis, on the Illinois Central, the Louisville, Evansville & St. Louis, the Louisville & Nashville, the Southern and other railroads. The city is situated on high ground in the midst of a productive agricultural and coal-mining region and has important manufactories, including glassworks, stone factories, an ice plant, a distillery, brickyards, breweries, a nail mill, tack works, foundries, machine shops, shoe factories and one of the largest rolling mills in the West. It is the seat of a Roman Catholic bishopric and its population consists largely of Germans. Among the chief buildings are a public library, St. Peter's Cathedral (Roman Catholic) a convent and four national banks. Trolley lines connect the city with St. Louis. Belleville was settled in 1814 and was first incorporated as a city in 1846. Population in 1920, U. S. Census, 24,823.

Belleville, N. J., a city of Essex Co., 10 m. from New York City and 3 m. n. of Newark, on the Passaic River and on the Erie Railroad. It is a popular residential suburb of Newark and has fine public buildings, parks, etc. The city has important manufactories of wire cloth, brass and copper goods, brushes, bicycle tires, chemicals and druggists' rubber supplies. Population in 1920, U. S. Census, 15,660.

Bell'flower, a common perennial herb of the Bellflower Family, brought over from Europe for garden cultivation. It has escaped from the gardens and become a familiar field and roadside flower of the Middle and Eastern states. The leaves are narrow and are borne on an erect stem which also bears the nodding, bell-shaped, purple flowers. It is distinguished from its close cousin, the harebell, by its more hardy stem and broader leaves. It blossoms in July and August.

BELLFLOWER

Bel'lingham, Wash., a city and the county seat of Whatcom Co., 96 m. n. of Seattle, on the east shore of Bellingham Bay and on the Northern Pacific, the Great Northern, the Bellingham Bay & British Columbia, the Canadian Pacific and other railroads. The city has an excellent harbor and is an important shipping center, being nearer the Alaskan markets than any other city in the United States. Lines of steamers connect with all the Puget Sound ports, and there is a large and growing coastwise trade. Bellingham has extensive lumber and agricultural interests, and salmon canning is an important industry. The city contains a modern street-railway system.

The representative buildings of the city include a county courthouse, a city hall, Y. M. C. A. Building, a number of banks, theaters, fine office buildings, the Bellingham Bay and Carnegie libraries and about 30 churches. The educational institutions include a state normal school, the largest in the state, an industrial school and several business colleges. There is an excellent public school system, the city maintaining two high schools and about 15 public schools.

Bellingham's chief industrial establishments comprise lumber and shingle mills, canning factories, foundries and machine shops, woodworking plants, brick and cement works and manufactories of machinery and tin cans used in the canning of salmon. Several fine varieties of sandstone are quarried near the city. Bellingham's excellent water supply is brought from Lake Whatcom about three miles from the city, the gravity system of waterworks costing $1,000,000. Electric power is furnished from the falls in the Noosack River 52 m. distant. Bellingham was founded in 1903 by the consolidation of the towns of Whatcom and Fairhaven and named from Bellingham Bay, which is supposed to have been named by Vancouver in 1792, in honor of Sir Henry Bellingham. A city charter was granted in 1904. Population in 1920, U. S. Census, 25,585.

Bellini, *Bel le' ne,* **Giovanni,** *Jo vahn' ni,* (1426-1516), an Italian painter and the founder of the Venetian School. He was a pupil of his father, a portrait painter of note, and his first works of importance were portraits. He was employed by the Republic of Venice to decorate the great council hall with scenes representing the historic glories of the city, and, though the task was most satisfactorily accomplished, his work was destroyed by fire and no part of it remains. His masterpieces are *Peter Martyr* and the portrait of Leonardo Loredano, both in the London National Gallery, and *The Crucifixion, The Coronation of the Virgin* and *The Transfiguration.*

Bellini, Jacopo (about 1395-about 1470), an illustrious Italian painter, born at Venice. He was a pupil of the Umbrian artist, Gentile de Fabriano. He exercised a potent influence upon the development of Venetian painting both directly and through his sons, Giovanni (1426-1516) and Gentile (1427-1507); and his son-in-law, Mantegna. The family may be regarded as the founders of the Venetian School of painting, preparing the way for Titian and Giorgione and other great artists who came after them.

Bel'lows, a machine for producing a blast or current of air, usually in connection with forge fires and pipe organs. The blacksmith bellows is used to increase the heat of the fire by making the coal burn more rapidly. A pair of bellows consist of three boards, the upper, the lower and a center one, all connected by flexible, air-tight leather sides. The upper board is stationary; the lower board is attached to a weight, and a lever moves it up and down. When this board falls, it sucks in air through a valve, and when it is raised the air is forced out of the lower chamber into the upper chamber through a second valve in the center board, and thence out to feed the fire, the valves closing automatically. A single bellows gives an intermittent blast of air, but when one is put over the other it makes a pair, which give a continuous and more uniform supply of air. Hand bellows were used by the ancients to quicken the kindling of fires, and were pear-shaped, with the hinge at the pointed end and with handles to open and close the bellows. See BLOWING MACHINE; FAN.

Bell-Smith, Frederic Marlett (1846-), an English painter, born in London. After studying painting in Paris, he came to Canada in 1867, teaching drawing in London, Ontario, and after 1888 devoting himself to painting in Toronto. He is chiefly known for his portrait and figure work, but he has executed some successful landscapes. Principal among his works are *Lights of a City Life, Queen Victoria's Tribute to Canada* and *The Landing of the Blenheim with Sir John Thompson's Remains.* He has exhibited at the London Royal Academy.

Bel'mont, August (1853-1919), an American capitalist, born in New York and educated at Harvard. He was head of August Belmont & Co., American representatives of the European banking firm of Rothschild, whom his father represented in New York after 1837. Besides having had numerous other financial affiliations, including that with the consolidated traction lines of New York City, he gained political prominence as a Democrat.

Beloit', Wis., a city of Rock Co., about 85 m. s.w. of Milwaukee and 91 m. n.w. of Chicago, on the Rock River and on the Chicago, Milwaukee & St. Paul, the Chicago & North Western and other railroads. Interurban electric lines also connect the city with Janesville, Rockford (Ill.) and other towns and villages. Excellent water power is derived from the river, and the leading manufactures include steam pumps, gasoline engines, windmills, flour, farm implements, woodworking and paper-mill machinery, cutlery, cyclometers, scales, shoes and paper. The adjacent country is largely agricultural, and there is a large trade in farm and dairy products. New linen mills were completed early in 1913, which have a large output.

The city is attractively situated on bluffs on both sides of the Rock River and has wide and well-paved streets and handsome residences. The chief buildings include the post office, a public library and a number of fine churches. Beloit is the seat of Beloit College, a flourishing, coeducational and nonsectarian institution, founded in 1847. The city has an excellent system of public schools, which includes the Central High School. The place was settled in 1824 and chartered in 1856. Population in 1920, U. S. Census, 21,284.

Bel"videre', Ill., a city and county seat of Boone Co., 78 m. n.w. of Chicago and 43 m. e. of Freeport, on the Kishwaukee River and on the Chicago &

Copyright by the International News Service.

BENEDICT XV

Cardinal Giacomo della Chiesa, elected Pope on September 3, 1914, to succeed Pius X.

North Western and other railroads. The town is situated in a fertile agricultural district, has large sheep-raising and dairying interests and is an important banking center. Its manufactures include boilers, sewing machines, automobiles, screen doors, flour, bed springs, butter, condensed milk, cheese and bicycles. Among the important features are a fine opera house, a public library, courthouse and county record building and a public park. Settled in 1836, Belvidere was first incorporated in 1857. Population in 1920, U. S. Census, 7,804.

Be'mis Heights, Battle of. See SARATOGA, BATTLES OF.

Benares, *Ben ah' rez,* a city of Hindustan, situated on the left bank of the Ganges River, 390 m. n.w. of Calcutta. It is one of the oldest cities in the world, and to the Hindus it is a sacred spot. Upward of 1500 modern temples, glittering minarets of ancient mosques, and houses painted a deep red and adorned with carvings afford a picturesque and magnificent view of the holy city from the river below. In the heart of the town, however, the streets are exceedingly narrow and winding. Surrounding Benares is the Panch-kos road, on which the Hindus make frequent pilgrimages. The manufactures include brass work, silk brocades, gold filigree work, gold and silver thread and lacquered toys. Population, estimated 209,331.

Ben'edict XV (1854-), Giacomo della Chiesa, the successor of Pope Pius X. He was born in Pegli, Italy, of noble parentage. After studying law at the University of Genoa, he went to Rome and there prepared for the priesthood, being ordained in 1878. Five years later he accompanied Cardinal Rampolla to Madrid, when the latter was papal nuncio, and remained there as secretary of the nunciature until 1887. Returning to Rome in that year, he entered the secretariate of state as one of the minor officials, and in 1901 was appointed substitute secretary of state. In 1907 Pope Pius appointed him Archbishop of Bologna, and in May, 1914, he was made a cardinal. On Sept. 3 of the same year the College of Cardinals elected him pope and he assumed the name Benedict XV. Pope Benedict is a man of vigor, breadth and administrative ability, and, like his successor, is simple, democratic and deeply spiritual.

Benedictines, *Ben" e dik' tenes,* a monastic order founded by St. Benedict at Monte Cassino in 529. For this monastery, destined to become one of the greatest seats of religion and learning that the world has ever known, he wrote his celebrated Rule, which, besides prayer, penance, poverty, chastity and obedience, added manual and intellectual labors to the vows of the monks. Thus the Benedictines, who soon embraced not only clerics but laymen, tilled the soil, transcribed and preserved literary works, wrote history and delved into science. They were soon leaders in defending religion and progress in the West, and they are largely responsible for our medieval civilization. The Rule of St. Benedict was carried into France, Sicily and, in a modified form, into Spain, England and Germany. The Order of Grammont, the Carthusians, the Cistercians and the Premonstratenses are reformed Benedictines. Present Benedictine influence is very powerful.

Bengal, *Ben gol'.* See INDIA.

Bengal, Bay of, a part of the Indian Ocean projecting inland between India and Farther India (Burma, Siam and Malacca). The Ganges, Brahmaputra, Mahanadi, Godavari, Krishna, Kaveri and the Irrawaddy rivers flow into it. There are few harbors on the western coast, but on the east are found Akyab, Syriam, Martaban and other ports.

Bengough, *Ben' goff,* **John Wilson** (1851-), a Canadian cartoonist. At Toronto, in 1873, he established *Grip,* a humorous weekly, and his cartoons for this magazine excited such interest as to be twice published in book form. After 1892 he contributed independently for various Canadian and English papers. Meanwhile he lectured extensively throughout Canada and America, even touring Australia and New Zealand of

late years, and in 1899 he was appointed professor of elocution in Wycliffe College, Toronto. He is the author of *Caricature History of Canadian Politics, The Gin Mill Primer, The Whole Hog Book* and the poems *In Many Keys.*

Ben'jamin, Judah Philip (1811-1884), an American statesman of English-Jewish parentage, was born in the West Indies and spent his boyhood in North Carolina. He studied law in New Orleans, where he practiced after being admitted to the bar in 1832. He rose to the head of his profession, was elected to the United States Senate in 1852, and served until the secession of Louisiana in 1861, when he withdrew. He was an able advocate of the Southern cause, and was appointed attorney-general of the Confederate States in 1861, and, later, secretary of state, a position which he occupied until the close of the war. He has been called the "brains of the Confederacy." In 1865 he went to England, where he practiced law until near the close of his life, and attained a position of eminence in his profession.

Ben'nett, (Enoch) Arnold (1867-), an English author and journalist, born in North Staffordshire. He studied law and later served as assistant editor and editor of the periodical *Woman.* Since 1900 he has devoted himself exclusively to literature. The characteristic of his work which has won for him almost immediate popularity is his insistence of the commonplace, everyday matters of life as preeminently worth while as literary themes, and a gentle humor relieves a somewhat rambling style of strain or tediousness. His works include *A Man of the North, Anna of the Five Towns, The Truth about an Author, The Grim Smile of the Five Towns, Buried Alive, The Old Wives' Tale, Clayhanger, Hilda Lessways* and *What the Public Wants.* He has also written, in collaboration with Edward Knoblauch, the play entitled *Milestones.*

Bennett, James Gordon (1795-1872), an American journalist, born in Scotland, is best known as the founder and editor of the New York *Herald.* Of Roman Catholic parentage, he was educated for the priesthood, which, however, he decided not to enter, and emigrated to America in 1819, landing at Halifax and later making his way to Boston. In 1822 he went to New York, where he began contributing articles of various kinds to the newspapers. Six years later found him in Washington as correspondent for the *Enquirer,* his letters being written in an unusually bright, attractive style. It was in May, 1835, that he issued the first number of the *Herald,* then a small, four-page sheet, sold for a cent a copy. Bennett wrote the entire newspaper himself, and when news was lacking, made up for the deficiency by sensational accounts. He introduced several features, then novel in journalism, such as articles from foreign correspondents, detailed accounts of speeches and incidents, and stock exchange reports.

Bennett, James Gordon, Jr. (1841-1918), an American journalist, born in New York City. At the death of his father he succeeded him as editor and proprietor of the New York *Herald.* He supplied means for Stanley's expedition to find Livingstone in central Africa, fitted out the Jeannette Polar Expedition, organized (with John W. Mackay) the Commercial Cable Company, founded the New York *Evening Telegram* and published London and Paris editions of the *Herald.*

Ben'nington, Vt., one of the county seats of Bennington Co., 52 m. s.w. of Rutland and 35 m. n.e. of Albany, N. Y., on the Rutland branch of the New York Central & Hudson River Railroad. A state soldiers' home is located here. It is noted as a manufacturing center, producing extensively knit goods, collars and cuffs, needles, woolens, hosiery, cashmeres, skirts and machinery. Bennington was settled in 1761, and named in honor of Gov. Bennington Wentworth of New Hampshire. Before the recognition of Vermont as a state Bennington was claimed both by New York and New Hampshire. It was the home of Ethan Allen and Seth Warner. On Aug. 16, 1777, near here occurred the Battle of

Bennington (See BENNINGTON, BATTLE OF). Bennington town contains two villages, named North Bennington and Bennington Center. Population in 1920, U. S. Census, 9,982.

Bennington, Battle of, a battle of the Revolutionary War, fought Aug. 16, 1777, near Bennington, Vt. To this village Colonel Baum led a detachment of 600 from Burgoyne's invading force to seize the American stores. Contrary to expectations, the British were not joined there by a large number of Loyalists, and almost the entire force was killed or captured by 2000 New Hampshire militia under Col. John Stark. Both sides had received reinforcements during the engagement, those from the British camp being completely defeated by Seth Warner and his Green Mountain Boys. All told, the Americans lost but 60 men, while the British loss was 1400, about one-seventh of Burgoyne's entire army. A beautiful monument was dedicated on the scene of the battle in August, 1891.

Bentham, *Bent'am,* **Jeremy** (1748-1832), an English jurist and philosopher, born in London. He graduated from Oxford at the age of 15, and took his master's degree at 18. After this he studied law under Blackstone, but his easy financial circumstances made it possible for him to devote himself to literary work, and he turned his attention to the theory and philosophy of law, becoming the greatest legal and political critic of his day. His criticism of the mode of criminal punishment did much to revolutionize the systems then in vogue. At the age of 28 he published *A Fragment on Government,* a keen criticism of Blackstone's commentaries. His *Constitutional Code* was one of his most important works. Bentham was also interested in logic and ethics. He is regarded as the founder of utilitarianism, taking as his motto, "The greatest happiness for the greatest number." His works were published in 11 volumes, and after his death a great mass of miscellaneous manuscripts was found in his library.

Ben'ton, Thomas Hart (1782-1858), an American statesman, born at Hillsborough, N. C. He studied law in Tennessee and was admitted to the bar at Nashville in 1811. He became an aid-de-camp to Andrew Jackson in the War of 1812. After the war he removed to St. Louis, where he practiced law and founded the *Missouri Inquirer,* which took a vigorous stand on public questions. When Missouri was admitted to the Union in 1820, Benton was elected to the United States Senate and served continuously for 30 years. He advocated the opening of mineral lands to settlement and urged the construction of a transcontinental railroad and of post roads. He argued persistently for the adoption of a metal currency, thus gaining the name, "Old Bullion." In 1852 he was elected to the House of Representatives for one term, after which he retired from public life and devoted himself to literary work. Possessed of a commanding intellect, resolute, temperate, industrious, tireless as a student, and endowed with a marvelous memory, he maintained himself among the leaders in the national councils and greatly influenced nearly every important public measure of his time. He published *Thirty Years' View* of the government from 1820 to 1850; *An Abridgement of the Debates of Congress,* in 15 volumes; and *An Examination of the Dred Scott Case.*

Benton Harbor, Mich., a city of Berrien Co., about 60 m. n.e. of Chicago on the opposite side of Lake Michigan, from which body of water it is about 1½ m. distant. It is on the St. Joseph River on a ship canal connecting it with the lake, and on the Michigan Central, the Pere Marquette, the Cleveland, Cincinnati, Chicago & St. Louis and other railroads. In the center of a famous agricultural section particularly adapted to fruit growing, the town carries on a large trade in grain and fruit. Lumbering is an important industry, and there are manufactories of fruit baskets, machinery, furniture, vinegar, cider, beet sugar, pickles, flour and preserved fruits. In

the vicinity are mineral springs, the waters of which are bottled and shipped. The place is a popular summer resort. Population in 1920, U. S. Census, 12,233.

Benzine, *Ben' zene.* See PETROLEUM.

Beowulf, *Ba' o woolf,* an Anglo-Saxon epic, the most important relic of the pagan period of Anglo-Saxon poetry. It probably existed originally in the form of short songs, which were sung by the Angles and Jutes before they invaded Britain. The scenes are laid in Denmark and southern Sweden. The only manuscript of it which we possess, now in the British Museum, is thought to have been compiled about the eighth century on English soil. Certain allusions to Christianity indicate a variation from the original form, but in general it is pagan in tone. The poem, which is over 3000 double lines in length, recounts the adventures of the hero Beowulf, who delivers the Danish Kingdom from a terrible monster and after many years receives his death wound in conflict with a fiery dragon. *Beowulf,* in spite of its crudeness and lack of poetic finish, possesses great strength and a charm peculiar to itself.

Béranger, *Ba"rahn"zha',* **Pierre Jean de** (1780-1857), a French poet, born in Paris. Poverty drove him to seek aid from Lucien Bonaparte, who was pleased with his early poetic efforts and granted him a pension and later a clerkship in the Imperial University. His satires on the Bourbon government led to prosecution, imprisonment and a heavy fine, but he was undaunted, and his last collection of poems, published in 1833, contained some of his finest and most powerful productions. In 1848 he was elected to the Constituent Assembly. Like Burns, though inferior to him, he is preeminently the poet of the people. The themes of his lyrics are national, and with sprightly grace he sang rather of the common sorrows and joys of men than of personal triumph and grief.

Ber'berry. See BARBERRY.

Ber'gamot, a small evergreen tree of the Rue Family closely related to the orange, lime and lemon. The fruit is yellow and rind-covered but resembles the pear, rather than the orange or lemon, in shape. The thick rind produces oil of bergamot, a heavy, aromatic liquid used as the foundation for many perfumes and medicines. The tree grows commonly in southern Europe, especially in Italy and France. Many members of the Mint Family, which have a fragrance similar to that of this plant, are also called bergamot.

Ber'gen, a seaport of Norway, situated on the promontory Nordnæs, 125 m. n.w. of Christiania. Among the buildings are the Cathedral, a public library, a nautical school, an observatory and several museums containing interesting collections. Fishing is the chief industry, the harbor of Bergen being picturesquely crowded with timber ships and fishing smacks. The city is the center of a large tourist traffic through Norway, and is now the chief ship-owning center of the country. It was founded about 1070. Population 76,000.

Bergh, *Burg,* **Henry** (1820-1888), founder of the Society for the Prevention of Cruelty to Animals in America. He was born in New York City, studied at Columbia College and spent 12 years in Europe, where in 1862 he became secretary of legation to Russia and acting vice-consul. The position he resigned, however, to devote himself to protecting animals, and the first American Society for carrying out his beneficent plans was incorporated in New York in 1866, with Mr. Bergh as president. By 1886, 39 states of the Union, besides Canada, Brazil and the Argentine Republic, had followed the example of the New York Legislature in what was one of the greatest reforms of the age. Mr. Bergh invented decoy pigeons for hunting, established the first ambulance for animals and was responsible for the founding of the Society for the Prevention of Cruelty to Children.

Bering, *Be' ring,* **Sea,** or **Sea of Kamchatka,** a narrow channel connecting the North Pacific and the Arctic Ocean and separating Asia from North America. The Aleutian Islands lie between it and

the Pacific Ocean. Its extent from east to west is over 1500 m.; from north to south, about 1000 m. The depth of the southern part exceeds 10,000 ft. It receives the waters of the Yukon River from Alaska.

Bering Sea Controversy, an international dispute in which Great Britain and the United States were the principal parties concerned, arising out of the depredations of unlicensed Canadian sealers on the seal fisheries of the North-Pacific Ocean.

The Pribilof Islands in the Bering Sea are the largest fur-seal rookery in the world, and for 90 years the seals had been preserved under the supervision of the Russian Government. This was continued by the United States after the purchase of Alaska in 1867. The Pribilof Islands, however, were leased to the North American Commercial Company, which was to have a monopoly of seal killing, under stringent regulations designed to prevent the extermination of the seals, the slaughter being restricted to 100,000 seals annually. The United States Government was to receive a royalty of $10 per skin, which would yield a yearly revenue of $1,000,000. A fleet of vessels was fitted out in 1886 in British Columbia by Canadian and American capital to hunt seals while feeding beyond the territorial three-mile limit. The Treasury Department of the United States then ruled that Bering Sea, to the western limit covered by the Russian cession, was under its exclusive control, and seizures of Canadian vessels were made by the American patrols. The British minister protested. Finally it was agreed to submit to a court of arbitration the question of the rights of the United States in Bering Sea, and of the regulations necessary for the protection of the seals if it were decided that the United States had not exclusive jurisdiction over the matter. The tribunal began its sessions at Paris on March 23, 1893, and rendered its decision on Aug. 15. It decided against the American claim to exclusive jurisdiction outside the three-mile territorial limit; established a close season for seals from May 1 to July 31; and forbade ocean sealing within 60 m. of the Pribiloff Islands. It also prohibited the use of steam vessels or explosive weapons. These regulations were to be enforced by the governments of Great Britain and the United States acting concurrently. These restrictions proved ineffectual, however, and a meeting of experts was arranged for November, 1897. The American offer to suspend sealing for a year provided the Canadian Government would prevent ocean sealing was refused, unless the Canadian vessels received compensation. Congress next prohibited sealskin importation unless the skins were from the Pribilof Islands. The whole matter was finally referred to the Anglo-American Commission in 1899, but with no definite conclusions. In 1910 the United States abrogated the leasing system for the seal fisheries on the Pribilof Islands, and the control of the fisheries was put under the charge of the commissioner of fisheries. In 1912 the Sixty-second Congress passed an act placing a closed season on the killing of fur seals for five years and preventing ocean sealing.

Bering Strait, a narrow channel connecting the Pacific with the Arctic Ocean and separating the continents of North America and Asia. It is from 150 to 250 ft. deep, and the distance at its narrowest part, between East Cape in Asia and Cape Prince of Wales in America, is about 40 m. Midway in the channel are three uninhabited islands; during the winter its waters are frozen. It was explored by Deshneff in 1648, by Bering in 1728 and later by Cook and Beechey.

Berkeley, *Burk'ly,* **Cal.,** a city of Alameda Co., south of and adjoining Oakland on the east shore of San Francisco Bay, and on the Southern Pacific, the Atchison, Topeka & Santa Fe and other railroads. The city is connected by ferry and electric lines with San Francisco, seven miles distant, of which city it is a favorite residential suburb. Urban and interurban electric lines traverse the city, making all sections easily accessible. Berkeley has a water front of three

miles which offers excellent advantages for manufacturing purposes. There is a new municipally-owned wharf costing $100,000.

The city is the seat of the University of California (See CALIFORNIA, UNIVERSITY OF), opened in 1873. New steel and stone buildings for this university have now been constructed. A campanile 300 ft. high cost $325,000. The chimes cost $25,000. There are also a number of seminaries, private schools and a new high school costing about $300,000. A state institution for the deaf, dumb and blind is located here. The noteworthy buildings include a city hall, costing $130,000, one of the best municipal buildings in the state, Masonic and armory halls, the Shattuck, Carlton, Cloyne Court, Lafayette and other hotels, a Y. M. C. A., Newman Hall, a number of banks, theaters, commodious business blocks and about 40 churches.

Berkeley is an attractive place of residence. The streets are broad and well kept, and there are many beautiful homes surrounded by lawns and gardens. There are a large number of manufacturing establishments, which include iron foundries, ink works, fruit-packing plants, soap works, cracker factories, oil refineries, a ramie-cloth factory, carbonic-gas works and manufactories of health food, spring beds, fertilizers and pianos. The city has had a rapidly-increasing growth and shows a net gain of over 27,000 in ten years. Berkeley was named after Bishop George Berkeley. It was incorporated as a town in 1878. The city has the commission form of government. Population in 1920, 56,036.

Berkeley, George (1685-1753), Bishop of Cloyne, a distinguished philosopher, born in Kilkenny County, Ireland. In his 15th year he entered Trinity College, Dublin, where he obtained a fellowship in 1707. He removed to London in 1713, and soon afterwards went to Italy for a short time as chaplain and secretary of the English legation. In 1716 he again went abroad and remained for four years. Berkeley wrote delightfully on many subjects. In his verses occurs the well-known expression, "Westward the course of empire takes its way." But his chief importance as a writer is in the realm of philosophy. He continued the development represented by Leibnitz, and perfected subjective idealism. The objective world of sense has no reality except as mental states. We perceive only our sensations themselves. Minds alone exist. He thus attempted to get rid of the dualism between mind and matter, by denying the existence of matter. Among his chief works are *Essay Towards a New Theory of Vision, Treatise Concerning the Principles of Human Knowledge* and *Siris: a Chain of Philosophical Reflections.*

Berkeley, Sir William (1610-1677), a colonial governor of Virginia, appointed in 1641. When Cromwell was victorious in England, Berkeley remained loyal to the King and offered an asylum in Virginia to other Loyalists. He was finally forced to resign in 1651, but was reappointed by Charles II at the Restoration in 1660, and served until 1676. He was interested in the agricultural and commercial development of the colony, but discouraged education and the public press, and expelled Quakers and Puritans. During the later years his administration was exceedingly harsh and unpopular, leading to an uprising known as Bacon's Rebellion (See BACON'S REBELLION). He executed so many persons after the uprising that Charles II recalled him with the remark, "The old fool has taken more lives in that naked country than I have taken for the murder of my father."

Ber"lin', a city of Canada, port of entry and county seat of Waterloo Co., in the Province of Ontario. In 1916 the name of the city was changed to Kitchener. A street electric line connects the city with the town of Waterloo about two miles to the north. The surrounding country is largely agricultural, and large quantities of wheat, corn and barley are raised. The mineral wealth of the country is rich and varied, comprising iron, copper, silver, nickel, plumbago and petroleum. The district is

largely settled by Germans. It is an important manufacturing city and contains a large beet-sugar factory, automobile plants, glove and button factories, bicycle works, piano and furniture factories, shirt and collar factories and leather and felt works. The city is supplied with electric power for manufacturing and lighting purposes from Niagara Falls. Population in 1911, 15,196.

Berlin, the capital of Germany, of the state of Prussia, and the province of Brandenburg, is situated on a low-lying, sandy plain on both sides of the river Spree, which meanders in a generally western direction through the northern part of the city. From the earliest times Berlin has been a seat of government, for more than seven centuries that of the Mark of Brandenburg; then of the kingdom of Prussia after 1701; then of the German Empire, after 1870 until the revolution of 1918. During its thousand years of history it developed from a village of primitive times to one of the great cities of the world, an exponent of modern civilization.

Streets, Squares, Bridges and Monuments. The city contains nearly 1000 streets, 87 squares, and 73 bridges. The most celebrated street, Unter den Linden, extends almost a mile in length, and a central promenade, planted with a double row of linden trees, divides it into two spacious avenues. All the important thoroughfares are paved with granite, bricks, asphalt or wood. The maintenance of the parts and public roads is carefully controlled, and snow in winter is removed by the authorities. The public squares are attractive and adorned with statues and monuments; the most spacious open places are the Opern-platz, the Gendarmen-markt, the Pariser-platz, the Schloss-platz and the Lutzow-platz. Among the bridges are the Schlossbrucke, adorned with colossal marble figures, the Lang-brucke and the Potsdamer-Viktoria-brucke. One of the features of the city is the large number of statues of former emperors and individuals prominent in German history,—such as Frederick the Great, Queen Louisa, Schiller, Goethe, Hegel and Bismarck.

Public Buildings. The principal churches are modern in style and of recent construction. Two interesting survivals of medieval days, are the Marienkirche and the Nikolai-kirche. The largest edifice is the new Cathedral, Italian Renaissance in style. Others include the Roman Catholic Church of St. Michael, the New Synagogue, the Petri-kirche, and the English Church of St. George. Official and government buildings have been erected with magnificent splendor. Prominent among these are the former Royal Palace,—with over 600 rooms, located in the center of the city, now used for government purposes,—the City Hall, the Reichstags-Gebaude, the National Gallery, the Old Museum, the New Museum, the arsenal, the Virchow Hospital, the Exchange and the German Bank.

Berlin being the seat of government, in former times the home of royalty, and the location of one of the most influential courts of Europe, quite naturally became one of the leading centers of music and drama, art and learning. The collection of pictures in the art galleries is among the finest in Europe. The Kaiser Friedrich Museum contains at least one masterpiece of almost all the great artists, and the paintings have been hung so as to produce a most effective result. The University of Berlin is among the most renowned in Europe. Its professors rank high among the distinguished scholars of the day. Other educational establishments include an Institute of Technology, a Military Academy, the School of Agriculture, the Artillery and Engineering School, the Academy of Arts, the School of Oriental Languages and the School of Music.

Commerce and Industries. Berlin is the center of the North German railway system and the focus of the main lines under the control of the Republic, and thus to Berlin as a center comes a great part of the agricultural products of Austria, East Prussia, and Russia. The Spree River is navigable and the city is connected by canals with the Havel and

Oder so that it can ship by water to Baltic sea ports. The principal industries are cloth printing and dyeing and the manufacture of clothing, iron, steel, railway cars and wagons, electrical apparatus, musical instruments, beer, gold, silver and bronze wares and carpets. Its breweries vie with those of Munich; its commerce in spirits, with that of Hamburg; its publishing houses, with those of Leipsic. Over 50 per cent of the working population is engaged in the industries, and almost every article manufactured for domestic and industrial use is represented by one or more establishments. The Bourse, Germany's chief market for stocks and shares, is the financial heart of the Republic and the center of foreign exchange.

GOVERNMENT AND HISTORY. The government of Berlin is controlled by the ministry of police and the civil authority, the latter consisting of a chief mayor, a mayor and a city council. The council is composed of members, elected to serve six years. To preserve stability, one-third are elected every two years. Matters pertaining to schools, hospitals, the care of the poor, cleaning and lighting the streets, drainage and water supply are thus under municipal control.

In the 12th century Berlin was a small fishing village. The Margrave, Albert the Bear, is generally considered the founder, but without sufficient evidence. During the 15th century the city developed in importance, but its growth was later checked by the siege of the Swedes in the Thirty Years' War. The Elector Frederick William made extensive improvements and Berlin soon began to flourish, further reforms being effected under the patronage of Frederick I and Frederick the Great. It became the capital of the German Empire in 1871. The industrial developments of the empire resulted in a rapid increase in wealth and all the elements of city greatness. At the close of the World War, the city was the scene of conflict between rival factions seeking to control the government. But the policy of the republican leaders in Germany prevailed and the city itself entered on a new cycle of its history. Population in 1920 estimated as about 2,000,000.

Berlin, N. H., a city of Coos Co., 98 m. n.w. of Portland, Me., on the Androscoggin River and on the Grand Trunk and the Boston & Maine railroads. It possesses valuable water power, as the river here courses through a narrow pass, descending very rapidly 200 ft. in the course of a mile. The city is situated 16 m. from the base of Mt. Washington and is surrounded by mountains. The manufactures of Berlin include lumber in various products, paper and pulp. The sulphite pulp mill is considered one of the largest in the country. The city is well laid out and has fine public buildings. Population in 1920, U. S. Census, 16,164.

Berlin, Congress of, a meeting of the powers of Europe at Berlin in June, 1878. Russia defeated Turkey in the War of 1877 and forced such terms from her in the Treaty of San Stefano (1878) that the other powers of Europe, jealous of Russia's growth in southeastern Europe, met at Berlin the same year and changed the terms of peace between the two countries. Instead of uniting Bulgaria and Eastern Roumelia into an independent state, the northern part of Bulgaria was given self-government and Eastern Roumelia remained a Turkish province. Servia, Montenegro and Roumania were made independent, but Austria was given the administration of Bosnia and Herzegovina. Thus the principle was established that the Turkish Empire in Europe was not to be dismembered, and all questions arising should be settled by a conference of all European powers.

Berliner, *ber' le ner,* **Emile** (1851-), the inventor of the telephone transmitter, or microphone, and of the method of reproducing sound utilized in some styles of talking machines. He was born and educated in Germany and emigrated to the United States in 1870. In addition to the microphone, he discovered several other means of improving the telephone service. He also invented the air-cooled engine with revolving cylinders, now used extensively on aeroplanes.

Berlin, University of, one of the most celebrated universities of the world, founded in 1810 at Berlin, Germany, by Frederick William III, at the suggestion of William von Humboldt, the first minister of education. It comprises departments of theology, jurisprudence, medicine and philosophy, which includes arts and sciences. There are also connected with the university several institutions, including institutes of physics, physiology, clinics, seminaries, museums and observations. The university is supported by the State and is under the direction of the minister of education. The faculty has always been noted for the high degree of scholarship of its members, many of whom are numbered among the world's famous men, such as Hegel, Niebuhr, Ranke, Karl Ritter and Helmholtz; in all there are over 400 members. The student body exceeds 11,000 and contains representatives from nearly every civilized nation. Some departments are, under certain restrictions, open to women of all countries except Germany. The university library contains over 185,000 volumes, and the students also have access to the Royal Library of over 1,260,000 volumes and about 34,000 manuscripts. Although one of the youngest of German universities, Berlin has become the most prominent.

Berlioz, *Ber" le ose',* **Hector** (1803-1869), a French musical composer, born at La Côte-Saint-André. He abandoned the field of medicine and began the study of music in the face of violent opposition. After a course at the Paris Conservatory he gave some time to travel, and in 1833 married Miss Henrietta Smithson, an Irish actress. He was one of the most brilliant critics of the last century. His music took shape in a variety of forms and ranged from religious to lyric themes. It is closely identified with that of the Romantic School and is highly impressionistic in effect. Berlioz evolved an entirely new theory for the use of sound volume, which he practiced frequently with thunderous effect; and he was one of the originators of "program music." His value to music lies not so much in the compositions he contributed, as in the impetus which he gave to the study of orchestral resources, though his symphony, *Harold in Italy,* the sacred work, *Te Deum,* and the opera *Les Troyens* are recognized masterpieces.

Bermu'da Grass, a member of the Grass Family, which, because of its sensitiveness to the cold, grows only in warm regions. It is a useful grazing plant in the South and is also used as a lawn grass because its roots form a thick sod which keeps its leaves green until late in the season.

Bermuda Islands, or **Somers Islands,** a group of small islands forming a British possession and lying in the Atlantic Ocean, about 600 m. s.e. of Cape Hatteras. Of the 300 islands, containing an area of about 12,000 acres, the largest are Bermuda Island, Somerset and St. George. They lie directly on the route from Europe to the West Indies, as well as midway between the latter and other British possessions in North America. Because of their strategical importance they are heavily fortified. Hamilton, on Bermuda, is the center of population and contains about 2250 inhabitants. The soil is fertile and the climate extremely healthful and pleasant. The islands are a favorite summer and winter resort, and yield a luxuriant vegetation. The scenery possesses remarkable beauty. The chief agricultural products are bananas, sweet potatoes, onions, arrowroot and corn. Lily bulbs constitute one of the principal exports. The Bermudas were discovered in 1522 by Juan Bermudez, a Spaniard; Sir George Somers, an Englishman, made the first settlement here in 1609.

Bern, the capital of the Swiss Canton of Bern and the political capital of the Swiss Confederation, situated on a high bluff almost completely surrounded by the River Aar. Prominent features of interest in the town are the fountains, the towers, the bear-pit, the town hall, museums, library, university and mint. There are few manufactures of note, except those of woolens, linens, stockings, clocks and toys. In 1298 the independ-

ence of Bern was secured; it entered the Swiss Confederation in 1353. Population estimated 100,000.

Bernadotte, *Ber na dot',* **Jean Baptiste Jules** (1764-1844), a French soldier who rose to distinction in the army of the French Revolution and became minister of war. At Austerlitz he ably served Napoleon and became one of his foremost generals. In 1810 when the Crown Prince of Sweden died, Bernadotte, through the influence of Napoleon, was chosen by Swedish legislators to fill his place. At the death of Charles XIII, the aged Swedish king, Bernadotte was crowned King Charles XIV. He proved as able a monarch as he had a soldier, and, though somewhat indebted to Napoleon for his power, was never subservient to him. He is buried at Stockholm, where he died. He was the founder of the present reigning house of Sweden.

Bern'hardt, Sarah (1844-), a French actress, born in Paris. Her real name is Rosine Bernard. She was of Jewish descent but was baptized at the age of 12 and brought up in the convent at Versailles. In 1862 she made her début in Racine's *Iphigénie* but was not successful. Her first triumph was as the Queen of Spain in Hugo's *Ruy Blas.* From 1872 to 1880 she was connected with the Comédie Francaise, but withdrew because of unfavorable criticism of her acting, and was forced to pay $20,000 for breach of contract. This led to a series of performances in London, followed by tours in America and leading European countries. She married Jacques Damala, a Greek, in 1882, but was divorced from him the following year. Her most successful rôles are in *La Tosca, Cléopâtre, Gismonde, La Samaritaine, Magda, L'Aiglon, Angelo* and a French production of *Hamlet.* Her marvelous voice, the magnetism of her personality and the extraordinary realism of her acting in tragic scenes have made her one of the leading actresses of her time. She is also known as a sculptor, artist and playwright.

Bertillon, *Ber"te"yon',* **System,** a plan or system for the identification of suspected criminals. It was invented in 1879 and set forth in 1885, by Dr. Alphonse Bertillon of Paris. In the main the system consists of three principles: (1) possibility of obtaining exact measurements of the parts of the body in a living subject; (2) extreme diversity of such dimensions in different subjects, no two ever being exactly alike; and (3) almost absolute fixity of the skeleton after 20 years of age. These measurements are taken with compasses, which assist in getting minute descriptions of each person. Photographs are also taken of full face and profile from a fixed chair and fixed camera, and descriptions as to color of eyes, etc., are also carefully given. Descriptions and photographs are then put together on cards of uniform size and classified for reference. The system is also of great value in distinguishing new criminals from old offenders, as it registers not only identity but the fact of a first offense. The Bertillon System was introduced into the United States in 1887 by Major R. W. McClaughry. From the first it met with a favorable reception and is now in general use in the larger penal institutions.

Ber'yl, a mineral much prized as a gem stone. It crystallizes in six-sided prisms, sometimes of enormous size. In structure it takes the form of layers, and occurs in all parts of the world. The chief varieties are emerald, a beautiful, transparent, green stone; aquamarine, bluish-green in color; and golden beryl. Oriental emerald, sometimes included in the group, is properly a variety of sapphire. Bogota produces the finest emeralds; Maine, North Carolina, Colorado and Brazil the choicest aquamarines; golden beryl is a native of Connecticut and North Carolina.

Beryl'lium. See GLUCINUM.

Besant', Sir Walter (1836-1901), an English novelist and critic, born in Portsmouth. From 1861 to 1867 he was senior professor of mathematics in the Royal College of Mauritius, and from 1868 to 1885 secretary to the Palestine Explora-

tion Fund. His novels are widely known, some of them written in collaboration with James Rice. Interest in problems of social reform in East London led to his writing *All Sorts and Conditions of Men,* which in its turn brought about the establishment of the People's Palace in the Mile End Road. He also wrote critical, historical and biographical works. With Rice he produced *Ready-Money Mortiboy, This Son of Vulcan* and *The Golden Butterfly.* Other of his writings are *Dorothy Foster, The Alabaster Box, The Orange Girl, The French Humorists* and *History of London.*

Bessemer, Ala., a city of Jefferson Co., about 12 m. s.w. of Birmingham, on the Alabama Great Southern, the Louisville & Nashville, the Kansas City, Memphis & Birmingham, the Birmingham Southern, the Atlanta, Birmingham & Atlanta and other railways. Bessemer is situated in a section abounding in mineral wealth; in the vicinity is the Red Ore Mountain range containing deposits of red hematite, the Warrior coal fields, fossiliferous iron-ore seams and also the Cahaba coal fields. There are besides valuable limestone quarries, which supply the limestone kilns of Gate City. Bessemer is famous for the number and variety of its works operated in connection with the iron industry. Mining, iron smelting and the manufacturing of iron, steel, coke, fire and building brick are extensively carried on. In the outlying districts truck farming is engaged in. In the amount of capital invested and the value of manufactured products, Bessemer is one of the first cities in the state. Laid out in 1887, the place was incorporated two years later. Population in 1920, U. S. Census, 18,674.

Bessemer, Sir Henry (1813-1898), an English inventor and engineer, born in Charlton. He established ironworks in St. Pancras, and in 1856, after several years' experimentation, announced a new and successful process for the manufacture of steel, later known as the Bessemer process. Steelworks were then erected in Sheffield, the cost of production was materially diminished, and he became wealthy from the large profits of his invention. He also discovered a new method of manufacturing gold and bronze powders and made improvements in type-casting machinery. In 1879 he was knighted and became a fellow of the Royal Society. See IRON AND STEEL, subhead *Bessemer Steel.*

Bes'semer Convert'er, an apparatus employed in transforming molten pig iron into steel, the process and converter being invented by Sir Henry Bessemer. The converter is a heavy, iron, pear-shaped vessel, lined with refractory material and having in its bottom a number of tubes, through which a powerful air blast is driven into the heated mass of metal during the process. By oxidizing the carbon in the iron with the air, sufficient carbon is removed to convert the iron into steel. Afterwards the molten metal is conveyed in ladles to molds in a manner similar to molding cast iron. The converter is supported on trunnions in order that it may be tilted for pouring. A similar converter is used in converting copper matte in crude metal. See BESSEMER, SIR HENRY; IRON AND STEEL.

Be'tel, a species of climbing plants of the Buckwheat Family, related to the peppers and, like them, grown in tropical countries. The stems are jointed and bear large, tapering leaves, which have a sharp, biting taste. These leaves are wrapped about the nuts of the betel palm and the whole chewed with great enjoyment by the natives of the East Indies, where the plant is most raised. The betel nut, or areca nut, is the fruit of a palm which has received the name betel only because of its association with the betel leaf. The tree is slender, with long, featherlike leaves, and bears orange-colored nuts which are about the size of a pea when ripe. The outer covering, which is removed before the nut is used, is fibrous; the kernel is acrid and bitter. Ceylon, which is the chief producer, exports over 3000 tons annually.

Beth'any, a small village upon the southeastern slope of the Mount of Olives, less than 2 m. from Jerusalem. In

the time of our Lord it was the home of his three intimate friends, Mary, Martha and Lazarus. Near Bethany Christ ascended to heaven. The present name of the village, El-Azaryeh, is taken from the name Lazarus.

Beth'lehem, a town of Palestine, memorable as the birthplace of Jesus Christ and of David, situated about 5 m. s.w. of Jerusalem, on the brow of a hill overlooking Moab and the plain of the Jordan River. Bethlehem is mentioned frequently in Scripture. Boaz, Obed and Jesse, father of David, were born here, Solomon's pools lay to the south, and to the southeast stood ancient Thekoa, built by Rehoboam. Still farther to the southwest is the valley made memorable by the destruction of Sennacherib's army, and to the northeast is the valley where the angels are said to have appeared to the shepherds. At the present time, the town, now called Beit Lahm, is a straggling village with one principal street. Its features of interest are three convents and a magnificent church built over a grotto reputed to be the spot where Christ was born. The inhabitants, most of whom are Christians, number about 8000.

Bethlehem, Pa., a city of Northampton Co., 55 m. n. of Philadelphia and 5 m. e. of Allentown, on the Lehigh River and the Lehigh Canal, and on the Philadelphia & Reading, the Lehigh Valley and the Central Railroad of New Jersey railroads. On the opposite side of the river here spanned by two bridges, one 700 ft. and the other 1100 ft. long, is South Bethlehem, the seat of Lehigh University. Monocacy Creek separates Bethlehem from West Bethlehem, formerly a separate town or borough but now consolidated with Bethlehem. The city was founded in 1741 by Moravians under Count Zinzendorf, and is the chief center for that sect in the United States. A Moravian Theological Seminary and Moravian Seminary for Young Ladies are located here. Bethlehem has attained a conspicuous position in the musical world on account of an annual festival which has developed from the love of the Moravians for music in their religious services, especially for the compositions of Bach, and is referred to as the American Oberammergau. In 1776-78 the general hospital of the Continental army was located here. Bethlehem contains the main offices of the Lehigh Valley Railroad and a number of important manufacturing establishments, including silk mills, foundries and machine shops, brass works, knitting mills and white-lead and paint works. South Bethlehem and Bethlehem consolidated in 1910. Population in 1920, 50,328.

Bev'eridge, Albert Jeremiah (1862-), an American statesman, born in Ohio. When he was still a boy his parents removed to Illinois. Here he began his education, which he completed at De Pauw University, Ind., graduating in 1885. Subsequently he studied law and, after being admitted to the bar, practiced in Indianapolis. He rose rapidly in his profession and in 1899 was elected United States senator from Indiana by the Republican Party, in which capacity he served until 1911. In 1912 he was the candidate of the Progressive Party for governor of Indiana, having joined the Roosevelt faction in the Republican split of that year. He is known not only as a strong leader and orator, but as a popular writer of magazine articles, some of the latter having been republished in book form under the title *The Young Man and the World.*

Bev'erly, Mass., a city and summer resort of Essex Co., 18 m. n.e. of Boston and 2 m. n. of Salem, on the Boston & Maine Railroad. It is situated on the north shore, on a bay, or inlet, of the Atlantic Ocean, and is connected by electric cars with Salem, Peabody, Gloucester and Wentham. Beverly has a good harbor, and many of its inhabitants are employed in navigation and the fisheries. It is the distributing station for the products of the Texas oil fields and has a regular line of steamers running between this point and Port Arthur, Texas. The city also owns numerous vessels engaged in cod fishery. There are large manufactories of boots and shoes, shoe ma-

chinery, morocco, oil clothing, belting and carriages. The New England Industrial School for Deaf-Mutes is located here. Beverly formed part of Salem until its incorporation in 1668. It was chartered as a city in 1894. Beverly Farms is a name given to the eastern portion of the town of Beverly and is a favorite summer residence for Bostonians. Ex-President Taft makes Beverly his summer home. Population in 1920, U. S. Census, 22,561.

Bi'ble (Greek *biblia, books*), the sacred book of Judaism and Christianity, the Old Testament being more distinctively the book of the former, and the New Testament that of the latter. The Bible is a book of many books, written at widely different times and by various men; yet it has a decided unity in its general religious theme, which treats of God and man, the being and nature of God, and the relations and duties of men to God and to each other. The Bible as we have it today is in three component parts—the Old Testament, the Apochrypha and the New Testament.

THE OLD TESTAMENT. The word *testament* came into use in this connection at a very early period as a translation of a Hebrew word meaning covenant. The Old and the New Testament are not in the nature of "last wills and testaments" from God in favor of man, but they are rather covenants between God and man. The Jews divided the Old Testament into three parts, the Law (Pentateuch), the Prophets, and the Hagiographa, or "sacred writings."

The Law is contained in the Pentateuch, composed of the five books of Moses: *Genesis, Exodus, Leviticus, Numbers* and *Deuteronomy,* each of which may be found treated under its own title.

The Prophets, or Historical Books, is the name given to that portion of the Old Testament which contains the fuller explanation and application of the Mosaic Law by the prophets, who were the preachers of their times; and which contains also the history of the Children of Israel under the leadership of the prophets. The names of the books of the earlier prophets are *Joshua, Judges, Samuel* (*First and Second*), and *Kings* (*First* and *Second*). Those of the later prophets are *Isaiah, Jeremiah, Ezekiel,* and the "Minor Prophets,"—*Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah* and *Malachi.* The Minor Prophets were treated as one book known as "the Twelve." See under respective titles.

The Hagiographa contains the poetical and apocalyptic books and all the other Old Testament writings not included in the Law and the Prophets. The word *hagiographa* is Greek, meaning sacred writings. They were divided by the Jews into three groups, as follows: (a) *Psalms, Proverbs, Job;* (b) *Song of Solomon* (*Song of Song*), *Ruth, Lamentations, Ecclesiastes, Esther;* (c) *Daniel, Ezra, Nehemiah* (*Ezra* and *Nehemiah* were originally treated as one) and *Chronicles* (*First* and *Second*). See under respective titles.

THE APOCRYPHA. See APOCRYPHA.

THE NEW TESTAMENT is the classical literature of Christianity, written by men who either knew its founder or belonged to the early circle of disciples. It may be divided into the historical, doctrinal and apocalyptic books.

The historical books are *Matthew, Mark, Luke, John* (See GOSPELS, THE) and *Acts of the Apostles* (See ACTS OF THE APOSTLES).

The doctrinal books, or Epistles, were written upon various occasions to apply the principles of the Gospel to the concrete conditions that arose as Christianity came into contact with the heathen world. They include the letters of Paul, comprising *Romans, First Corinthians, Second Corinthians, Galatians, Ephesians, Philippians, Colossians, First Thessalonians, Second Thessalonians, First Timothy, Second Timothy, Titus, Philemon* and, possibly, *Hebrews* (See PAULINE EPISTLES); the one book by James, bearing his name; two books by Peter, bearing his name; three short letters by John, bearing his name; and *Jude.* See JUDE,

Epist. e of; James, Epistle of; John, Saint; Peter, Saint.

The apocalyptic book is known as the *Apocalypse,* or *Revelation.* See Revelation, Book of.

Original Languages and Dates. The Old Testament was written in Hebrew during a long period of years preceding B. C. 100. The Apocrypha was written in Greek during the two centuries preceding the Christian Era. The New Testament was written in Greek during the first century of the Christian Era.

Versions. The Old Testament was translated from the Hebrew into Greek before 100 B. C. This translation is known as the Septuagint, and includes the Apocrypha (See Septuagint). From the Septuagint, the Latin translation known as the Vulgate was made (See Vulgate). This became the basis of the Catholic Bible, which therefore contains the Apocrypha as authentic and authoritative writings. All of these versions, and others that need not be mentioned here, formed the basis of our earliest English versions. After translations of certain parts of the Bible, the first full translation was the Wyclif Bible, 1380-82. Following this came the translation of William Tyndale, whose New Testament has been of great use to later translators. It was printed in 1525. The Miles Coverdale Bible appeared in 1535. Cranmer's Bible was the authorized version from the time of the royal proclamation of 1540 until 1568. The Geneva Bible, 1557-1560, omitted the Apocrypha. The Bishop's Bible was the authorized version from 1568 until 1611, when the King James version appeared. This version stood the test of criticism for many years; but during those years there was a considerable change in the English language, and much new matter was discovered bearing upon the original Biblical text. A new revision was therefore undertaken at the instigation of the Convocation of Canterbury in 1870. Two companies of British scholars, with whom two companies of American scholars cooperated, brought the work to a satisfactory conclusion in 1881. The numerous versions of the English Bible that have been given to the world during later years, and especially during the later part of the 19th century, are, as we should expect them to be, the best the world has ever seen. The reason for this will appear in the following consideration.

Textual Criticism. By this term we mean the scholarly and critical study of all the old versions and translations, especially of all the oldest manuscripts, and the comparison of these with each other and with external evidence, as found in history, and particularly in archæology, for the purpose of securing the most accurate text possible in the original Hebrew and Greek, from which our new translations have been made. The result of this criticism is that we now have by far the best and most authoritative texts of the original Biblical writings that have been known since the beginning of the Middle Ages.

This assures greater reliability in the English Bible. Of all ancient history there is none that has received more careful and scholarly study, and there is none that may be more safely depended upon as reliable.

Influence. The influence of the Bible has been immeasurable. It has affected language and literature, philosophy and culture, individual morality and social movements, national history and the progress of modern civilization. This influence is indicated by the fact that the Bible is now published in every language and in many dialects, and also from the number of volumes put into circulation annually. In 1911 the various Bible societies of the world circulated more than 14,000,000 copies. In addition to these an enormous number of copies are published and sold by secular publishing companies. Probably half a billion copies of the Bible have been put into circulation in the world.

Bibliography, *Bib" li og' ra fy,* a word signifying the knowledge of books with reference to the subjects of which they treat, their rarity, curiosity, reputed and real value, materials of which they are

composed and their rank. Considered as a science, it has to do with the examination, collation and description of books, their enumeration and arrangement in lists for purposes of information and with the bibliography of bibliography. It has two general divisions: intellectual bibliography, which concerns itself with the contents of books; and material bibliography, which deals with their external character. France is in the van in the cultivation of bibliography, but other nations are earnestly taking up the work. Among the many excellent bibliographical works which embrace American writings are Duyckinck's *Cyclopedia of American Literature,* the *American Catalogue,* Scribner's *Bibliographical Guide to American Literature* and *Reader's Guide to Periodical Literature,* edited by Anna Lorraine Guthrie. There are also bibliographical works of a less general nature which deal with special departments of literature.

Bicycle, *Bi' sik el,* a light vehicle for one person, with two wheels tandem, propelled by means of treadles attached to a diamond-shaped frame. The *draisine,* built in 1816, was a very rude two-wheeled vehicle and had little to recommend it. It was propelled by pushing the feet upon the ground. The velocipede, patented in France in 1865, was, therefore, the first two-wheeled vehicle of this kind which is worthy of consideration. It was of the same model as the *ordinary,* or high-wheeled bicycle, developed in England about 1873. In both, the front wheel was much larger than the rear, and both were propelled by cranks attached to the hubs of the front wheel. The ordinary of 1875 weighed about 65 lb., and the rider's seat was more than five feet above the ground and so nearly over the center of the big wheel that serious falls were not uncommon.

The diamond-framed bicycle of today was originally called the safety bicycle. Its frame being of steel tubing, the safety weighs, usually, less than 25 lb. It is propelled by a chain which runs over a sprocket wheel turned by the crank shaft, or by levers with bevel gear which transmit the motion of the crank shaft to the rear wheel. The wheels, which are of equal size, have pneumatic tires. In 1900, American factories were producing about 1,000,000 bicycles per annum; but some have since turned to the manufacture of motor cycles, while others have become automobile factories. However, bicycles, at least equal to those which cost $100 or more in 1900, are now very much cheaper; and, though less used for pleasure, they are of the greatest value to thousands of workmen, who find them essential to the successful performance of their tasks.

Biddeford, *Bid' e ferd,* **Me.,** a city and summer resort of York Co., 15 m. s.w. of Portland, on the right bank of the Saco River, which separates it from the town of Saco, and 6 m. from the Atlantic Ocean, and on the Boston & Maine Railroad. The development of Biddeford was favored by the abundant water power furnished by the Saco Falls, the stream descending here about 40 ft. Some of the most important cotton mills in the country, the products of which are found in the markets of many states, are located here. Granite of a superior quality is also shipped from here, and there are extensive manufactories of machinery, lumber, wooden boxes, boots and shoes, etc. The town was named from Biddeford, England, the home of some of its early settlers. A settlement was made at Biddeford Pool, six miles south, in 1616, near the mouth of the Saco. Biddeford was settled under a patent in 1630. This was long the chief settlement in the Province of Maine. It was chartered as a city in 1855. Population in 1920, U. S. Census, 18,008.

Bid'dle, John (1615-1662), the founder of English Unitarianism. He was educated at Magdalen College, Oxford. In 1645, while serving as master of the free school in the town of Gloucester, he was put in jail for advancing heretical opinions in regard to the personality of the Holy Spirit, but was bailed out. Two years later he was condemned to imprisonment for heresy by the Parliament at Westminster; while in prison he wrote

tracts in support of his convictions, and on his release, in 1852, began to gather a congregation of those who believed as he did. The members were eventually known as Unitarians. Biddle was subsequently imprisoned at various times, and he died in jail. See UNITARIANS.

Bienville, *Byan" vele',* **Jean Baptiste Le Moyne** (1680-1765), a French governor of Louisiana, born in Montreal, Canada. In 1699 he made an expedition with his brother, D'Iberville, to the mouth of the Mississippi, and established a settlement at Biloxi the following year. He founded New Orleans in 1718 and made it the capital of Louisiana five years later. He was governor of Louisiana until 1726, was reinstated in 1733, with the rank of lieutenant-general, and returned to France in 1743. His code of laws remained in force until the purchase of the Louisiana territory by the United States.

Big Bethel, Battle of, an engagement of the Civil War, fought June 10, 1861, at a small village in Virginia, on the York Peninsula. A detachment of Gen. Benjamin F. Butler's troops, under Gen. E. W. Pierce, was defeated by the Confederates, who were stationed there under General Magruder.

Big'elow, John (1817-1911), American journalist and author, born on a farm in the Catskills. After practicing law for several years he turned to journalism, in 1849 becoming joint owner with William Cullen Bryant of the New York *Evening Post,* of which he was the managing editor until 1861. In this year he became consul at Paris, and from 1864 to 1867 served as United States minister to France, in this capacity rendering valuable service to his country in the days following the Civil War. He was an ardent tariff reformer and a firm advocate of peace, and after his return to America held many positions of trust and honor. He edited the original manuscript of the Franklin *Autobiography,* and the writings of Franklin, and published, among other works, *Life of Samuel J. Tilden, France and the Confederate Navy* and *The Mystery of Sleep.*

Bigelow, Poultney (1855-), an American author, born in New York City. He is the son of John Bigelow. He graduated at the Columbia Law School in 1882 and was admitted to the bar, but abandoned law for journalism and travel. In 1875-6 he made a tour of the world, undertaking canoe voyages on the principal waters of Europe. He was the first to pass with a canoe through the Iron Gates of the Danube. The leading universities of the country have engaged him as a lecturer on modern history, and, among other distinctions, he has been elected a member of the Royal Geographical Society. He was, successively, editor of *Outing,* London correspondent of *Harper's Weekly,* and Spanish-American war correspondent of the London *Times.* Among his works are *The Border Land of Czar and Kaiser* and *A History of the German Struggle for Liberty.*

Big'horn", a mountain sheep, belonging as do all sheep, to the Bovine Family. They are found in the Rocky Mountains, Alaska and Kamchatka, and have received their name because of the long, curling horns. There are three species, which are brownish-gray with more or less broad white markings, or pure white. All are swift, sure-footed and exceedingly shy. They travel in herds of thousands and are graceful in appearance as they bound from rock to rock. In America the bighorn is sometimes called the Rocky Mountain sheep. Unrestricted hunting has nearly exterminated the bighorn, in the United States, and they are now found only in the most secluded regions on the high mountains.

Bighorn River, a river of Wyoming and Montana. It rises in the Rocky Mountains and at first flows southeast until it reaches the foothills of the Bighorn Mountains; in this part of its course it is known as the Wind River. From there it flows north and makes its way through the mountains into Montana and later enters the Yellowstone. The river is 500 m. long and is navigable from the Yellowstone to Ft. Custer.

Bignonia, *Big no' ni a,* a woody, climbing plant of the Bignonia Family, in the

United States found only in the South. It is a smooth, evergreen plant, which climbs by means of tendrils growing from the bases of the leafstalks and between the narrow leaflets. The flowers also arise from the axils of the leaves and are large trumpet-shaped blossoms, having their margins cut into five deep lobes. They are orange-colored without and bright yellow within. They are in bloom in the spring, and following them in the early summer the fruit pod appears. In United States there is but one native bignonia, although many others have been introduced from tropical countries.

Bile, a bitter secretion found in the bodies of certain animals, which aids in the digestive process. Human bile is separated from the blood in the portal vein by the cells of the liver and is collected by the biliary ducts. These ducts unite to form the hepatic duct, which connects with the cystic duct from the gall bladder. About three and one-half pounds of bile are secreted every 24 hours. It flows continuously, and when not required for digestion is stored in the gall bladder. During digestion its function is to reduce the fatty substance in foods and to stimulate the muscular activity of the intestines. It also probably retards the decomposition of some foods. An unhealthy condition resulting from irregular bile secretion causes biliousness. Bile sometimes solidifies in the gall bladder, forming gall stones, which cause intense pain in passing through the small ducts on their way out of the body. See DIGESTION.

Billiards, *Bil' yahrdz,* a game of skill requiring keen sight and a quick, firm hand. It is played on a heavy table about three feet high, and either four and one-half by nine or five by ten feet in size. This is surrounded by a raised cushion, which, like the surface of the table, is covered with heavy felt of a dark green that is both restful to the eyes of the player and suitable as a background for the white or colored ivory balls required. Commonly two white balls and one red ball are used, these being two and three-eighths inches in diameter. The white balls are distinguishable because one bears a dark spot. The table is marked with a center spot, and with two others, in a line with this, which divide the table's length into four equal divisions. The cue, with which the balls are driven, is about one and one-half inches thick at the butt end and four and one-half or five feet long and tapers to a point of from one-fourth to five-eighths of an inch. The butt is held between the fingers and thumb, not tightly in the palm. The point is tipped with leather and rubbed with chalk to prevent its slipping on the surface of the cue ball.

The leader places his opponent's ball on the spot near the head of the table, and attempts to drive his own, from any position nearer the head of the table, but at least six inches from the other, against the red ball (placed on the farthest spot) in such manner that it will also strike his opponent's ball before coming to rest. If successful, he scores a carom, or point, and continues playing. Taking the balls as he finds them after the first shot, he plays his own ball against either of the others, and so continues until he fails of a carom. Unless a ball jumps from the table, it is not respotted. In that case it goes to the center spot, if both the others are occupied, but ordinarily to its own, red or white. If, however, a player finds his cue ball in contact with another, the balls must be respotted, as at the beginning. Games are usually for 50 or 100 points. Experienced players complicate the game by requiring that at each shot the cue ball must touch the cushion, as well as both the other balls. Various handicaps are also introduced by the most skillful. See POOL.

Bil'lings, Josh. See SHAW, HENRY WHEELER.

Billings, Mont., a city and the county seat of Yellowstone Co., 240 m. s.e. of Helena, on the Yellowstone River and on the Burlington & Missouri River, the Northern Pacific and other railroads. It is situated in a noted stock-raising dis-

trict and is one of the largest inland wool markets in the United States, both wool and live stock being exported. Deposits of coal, limestone and marble occur in the vicinity. Prominent buildings of Billings are the courthouse, city hall, public library and opera house. Population in 1920, U. S. Census, 15,100.

Bill of Attainder, *At tane' der.* See ATTAINDER.

Bill of Credit, a written request that credit be given the bearer on the security of the writer, who thereby makes himself responsible for indebtedness thus incurred.

Bill of Exchange, an order written and signed by one party (the *drawer*) directing a second party (the *drawee*) to pay to a third party or to his order, or to the bearer (the *payee*), a specified sum of money at a designated time. When both drawer and drawee reside in the same county or state the bill is called *inland* or *domestic;* otherwise, *foreign.* The usual form of a domestic bill of exchange is as follows, although no set order of words is required:

$500.00 Chicago, Feb. 12, 1912.

Sixty days after date pay to John Smith, or order, Five Hundred Dollars, for value received, with interest at six per cent per annum, and charge to account of JOHN DOE.

To John Jones,
St. Louis, Mo.

Foreign bills of exchange usually differ slightly from the above, often being drawn in sets of three, one copy going to each of the three parties involved in the transaction. When a bill of exchange has been *accepted* by the drawee (which is done by writing on the document "accepted" signed by his name), it becomes a legal obligation against him, the same as if it were his note. The payee may transfer the bill to any other party by properly indorsing it, which is done by writing his name on the back of the document. A bill of exchange drawn on a bank, payable on demand, becomes a *check;* and when so drawn on one bank by another is called a *draft.* The term ***draft*** is also popularly used as a name for any bill of exchange. See CHECK; DRAFT; NEGOTIABLE PAPER.

Bill of Lading, originally a document, or memorandum in writing, issued by the master of a ship both as a receipt for goods delivered on board his vessel and as evidence of a contract to deliver these to a specified party at a specified place, subject to the ordinary accidents of the sea. Because voyages were formerly of long duration, it naturally came about that the holder of a bill of lading might transfer ownership by indorsement upon the bill. Bills of lading are not, however, considered negotiable paper, since they represent property and not money. Those freight receipts issued by railroads have commonly been termed *waybills* (See COMMON CARRIER). In either case, the bill of lading should be in three or more parts, one each for the shipper, the carrier and the consignee.

Bill of Rights. A bill of rights is the substance of the rights and privileges claimed by a nation against the oppression of the rulers, either real or prospective. The term is also used to denote an enactment or agreement embodying a fundamental right or principle. A bill of rights has been inserted in the constitutions of most of the states of the United States setting forth the rights of the people which shall not be infringed, and placing limitations upon the rights of the state. The first ten amendments added to the United States Constitution have also been given this name, as they were added to satisfy the objection of some of the states that the Constitution did not specifically cover certain inalienable rights of the people.

In English history the Bill of Rights is a Parliamentary act passed in December, 1689, upon the accession of William and Mary to the throne, which embodies the principles of political liberty now established in the English system of government. In tracing the history of the Bill of Rights it will be found that many English colonists brought its political standards into New England, and its principles, defended by them, thus be

came the solid foundation of our free government.

Bill of Sale, a formal statement in writing, and usually under seal, given as evidence of the sale of personal property which is not at once transferred to the purchaser. Such a bill, however, is convenient evidence of ownership, even if the purchaser takes immediate possession of the property. Under the laws of England, and of the United States, the transfer of registered ships must be by bill of sale. Title to the stock, fixtures and good will of a business, or to household furniture, is commonly thus transferred. A conditional bill of sale may be given as security for a loan. Such are often considered chattel mortgages.

Bilox'i, Miss., a city of Harrison Co., 60 m. s.w. of Mobile, Ala., and 80 m. n.e. of New Orleans, on Biloxi Bay, an inlet of the Gulf of Mexico. The Louisville & Nashville and other railroads enter the city, and there is a marine transportation besides. The canning of oysters, shrimp and crabs, and of vegetables and fruits are among the leading industries; and there are shipyards and manufactories of lumber products and naval stores. A fine variety of pottery is made here. Biloxi is one of the most popular of Southern resorts. There is a beautiful beach, six miles in length, and the city itself is attractive with shell-paved streets and well-ordered residences and public buildings. A fine automobile drive from Biloxi to Pass Christian extends along the beach. In 1699 a settlement was established by D'Iberville across the bay from the present city and called Biloxi. Near by was built Ft. Maurepas, the first French fort in this part of the country. In 1712, this settlement (now known as Old Biloxi) having been visited by a destructive fire, a permanent settlement was made on the site of the present city, the first within the present limits of Mississippi. For a time the town was the capital of the French territory in this part of North America. In 1872 the place was incorporated, and it is now governed under a charter of 1896. Population in 1920, U. S. Census, 10,937.

Bimet'allism, the free and unlimited coinage of both gold and silver at whatever ratio a government may determine. It was at one time proposed, for instance, that the United States should by law fix the value of one ounce of gold as equivalent to that of 16 ounces of silver. But it is obvious that a considerable increase in the production of either metal would change their relative value and thus seriously embarrass a government which had attempted to fix these values by law. Today, under the theory of monometallism, the gold dollar has become the unit of value in the United States. Although not coined, this consists of 25.8 grains of gold nine-tenths fine. Every great commercial nation of the world has adopted monometallism, and gold is therefore the monetary standard by which the value of all other products is measured.

Bind'ing Twine, a twine made especially for use in self-binding harvesters (See REAPING MACHINE). The twine is made from Manila hemp or sisal, the Manila producing the best quality. The fiber is received at the factories in bales. It is cleaned and dusted, then the useless fiber is combed out, leaving the long strong fiber for the twine. This is corded and made into a narrow ribbon, which, when twisted, produces a twine of the right diameter. The twine is wound on bobbins, from which it is wound into large balls. The manufacture of binding twine is an important industry, since large quantities are used in every country where the self-binding harvester is found. A twine factory is usually an important part of a large manufactory of reapers and binders.

Bind'weed", a name given to several twining or climbing herbs of the Convolvulus Family. They are generally noticeable little plants which fill a worthy purpose in concealing heaps of stones or wayside rubbish. The leaves are rather more pointed and arrow-shaped than those of the convolvulus and the flowers are always pink or white; otherwise the convolvulus, bindweed and morning-glory are very similar. The hedge bindweed is probably the most common; the

trailing bindweed grows flatly upon the ground; the small bindweed has tiny flowers in groups of two; and an erect bindweed has almost straight stems which twine only near the summit. The flowers of all bindweeds are short-lived. A knot bindweed of the Buckwheat Family has external resemblances to the true bindweeds, but it is without a corolla, having in its place a three- to six-parted, colored calyx. It is found in waste places from Canada to Georgia. See CONVOLVULUS; MORNING-GLORY.

Bing'hamton, N. Y., a city and county seat of Broome Co., 80 m. s.e. of Syracuse, 50 m. e. of Elmira and 215 m. n.w. of New York, on both banks of the North Branch of the Susquehanna River, at the mouth of the Chenango River, and on the Delaware, Lackawanna & Western, the Erie, the Delaware & Hudson and other railroads. An extensive system of electric railways connects with the neighboring towns and cities. Binghamton occupies an area of 10 sq. m. and has an elevation of 850 ft. above sea level. Johnson City, Port Dickinson and Endicott are attractive suburbs with important manufacturing interests. A number of bridges cross the rivers at various points within the city. Binghamton is known as the "Parlor City" on account of its beautiful situation in the Susquehanna Valley, its wide and well-kept streets shaded with elms and maples, and its handsome residences. The city is a commercial center for southern New York and northern Pennsylvania. There is a large Chamber of Commerce.

PARKS AND BOULEVARDS. Binghamton has many miles of city highways and contains a number of parks, the most attractive of which are Ross Park of over 100 acres, Ely Park of 134 acres, Bennett Grove, a driving park and exposition grounds.

INSTITUTIONS. Among the city's educational and charitable institutions are Lady Jane Grey school, a private preparatory school for young ladies, St. Mary's and the Susquehanna Valley orphan asylums, a state hospital for the insane, city hospital, high schools and fourteen elementary schools. The public buildings include a state armory, Central High School, a courthouse, city hall, Federal Building, city library and Supreme Court Law Library.

INDUSTRIES. Binghamton has extensive manufacturing industries, chief of which is the cigar industry, the city ranking third in cigar manufacturing in the United States. Other manufactured products include flour, agricultural implements, scales, chemicals, furniture, boots and shoes, photographic supplies, silks, electric appliances, time clocks, steam and gas engines, window glass, wood alcohol, proprietary medicines, leather, dynamos, sheet metal, fire-alarm apparatus, paper bags and envelopes, refined oil, carriages and sleighs, extracts, washing machines, valves and overalls.

HISTORY. The first settlement was made in 1787 and the place was called Chenango Point. In 1800 its situation was slightly changed and the name Binghamton was adopted in honor of William Bingham, the proprietor of the land in the vicinity, who was a member of the United States Senate in 1795-1801. Binghamton was incorporated in 1834, and in 1867 was chartered as a city. Population in 1920, U. S. Census, 66,800.

Binoc'ular Vision. See STEREOSCOPE.

Biology, *Bi ol' o jy,* the science of life, whether of plants or animals. It includes the sciences of botany, zoology and physiology, as well as many others, and has to do with their relations to each other and the explanation of the various life processes. Among the theories which biologists have accepted are the theory of the cellular structure of all organisms, the evolution of all forms of life from a simple form, and the belief that all life processes are accompanied by chemical change. Scientists have abandoned the theories of spontaneous generation and special creation. As taken up in schools, biology consists chiefly of a study of the lower forms of animal and plant life and their relations to each other. See BOTANY; ZOOLOGY.

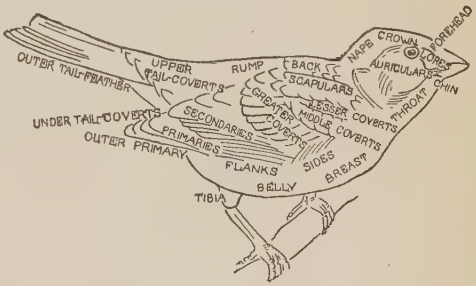
Birch, a delightful Northern tree of the Birch Family, which is probably the most loved and most used of any tree. It grows best in Northern lands, but is exceedingly adaptable and is known in southern Europe as well as in North Polar regions, as near to the Pole as trees approach. The effect of the tree, whether in groves or standing alone, is one of grace and beauty, and artists love to depict its curved white trunks and shapely tops. The bark is generally distinguishable by being white or light in color but may always be known by a velvety texture, due to a slight resinous exudation which softens the bark. The branches are very slender and bear thin green leaves upon long, twisted stems. These stems cause the leaves to rustle in much the same manner as the poplar leaves. Growing, as the birch often does, among dark green pines, its light leaves have a fairy beauty in summer and a golden radiance in autumn, when they suddenly turn to a rich, unshaded yellow. In shape the leaves are almost triangular, with irregularly saw-toothed margins. The flowers are in two kinds of catkins; one long and plump, the other stiff and slender.

The white birch groves of the North present a most fascinating sight to one whose knowledge of trees consists chiefly in familiarity with dark-stemmed species. The bark splits and peels off in broad, pliable sheets, and the Indians, who use it for canoes, and the woodsmen, who employ it in many ways, know the season at which it may be stripped without injury to the tree.

Our common birches other than the white birch are: the dwarf birch, a small-leaved shrub; many varieties of black, or river, birch, whose bark is dark in maturity; the cherry birch, whose bark and wood resemble the cherry in appearance; the paper birch, used in making paper, whose outer skin peels in thin strips but clings to the tree, where it rustles with every breeze; and the yellow birch, much like the paper birch in habit, but whose gray, thin, tissuelike skin covers a yellow bark.

The wood of the birch is light, firm and tough and it and the bark are put to innumerable uses. The Laplanders make umbrellas from the water-shedding bark, and the Highlanders build, thatch and furnish their houses and prepare their nets, fish casks and trenchers from its wood and bark. In the United States the various species are in great demand for furniture, the "curly birch" being decidedly popular. Tanneries, ink factories, drug plants, dyeing establishments and charcoal kilns are among the chief concerns which utilize the birch.

Birds, the feathered inhabitants of the air and probably the most charming and the most loved members of the animal world. Scientifically they are described as warm-blooded, air-breathing



PARTS OF A BIRD

Vertebrates, having a rounding feather-covered body, forelimbs modified to form wings and hind limbs adapted for walking, wading, swimming or perching. Birds are generally thought of as the flying animals, but bats and insects, though not birds, do fly, while ostriches do not. There are certain peculiarities of structure common to all birds. The neck vertebræ number from 10 to 26. The digestive apparatus includes a crop, stomach and gizzard, each of which is especially enlarged in certain groups; as, the gizzard in birds which eat grain, corn and pebbles (gallinaceous birds) and the crop in those which feed upon animal matter or carrion (birds of prey); because of this efficient digestive system birds do not need to masticate their food. The skeletons of birds are usually very light, often containing air spaces, thus enabling them more easily to maintain

themselves in the air. The breastbone in all but the lowest birds, such as the ostrich and its relatives, is very large and strong and is provided with a keel, to which the strong wing muscles are attached.

CLASSIFICATION. The study of birds, their classification, nesting habits, geographic description, etc., is called ornithology, and is a science that has been attractive to so many that the bird families have been well studied. Birds are classified by differences in their bills, feet and wings, their internal structure and their general habits. The main groups are divided into orders, families, genera and species, similar to those same divisions in other plant and animal classifications. Several classifications of birds are now in use, that adopted by the American Ornithologists' Union being the most familiar. This includes 22 orders, but for ordinary purposes the familiar birds may be grouped as follows:

Runners	Ostrich; Emu; Cassowary.
Divers	Loon; Grebe.
Swimmers (Four Orders)	Gull; Comorant; Duck; Goose.
Waders (Two Orders)	Heron; Crane; Snipe; Sandpiper.
Scratchers (Two Orders)	Bobwhite; Ruffed Grouse; Turkey; Pigeon; Dove; Hen.
Birds of Prey	Vulture; Owl; Eagle; Hawk.
Climbers	Wryneck; Woodpecker; Flicker; Parrot.
Swifts	Whip-poor-will; Nighthawk; Humming Bird; Swift.
Perchers	Jay; Robin; Thrush; Sparrow; Tanager.

SIZE. The size of birds varies from the little humming bird, scarcely exceeding three inches in length, to the giant ostrich, standing eight feet in height. The neck may be short and the head set squarely on the shoulders, as in the case of the sparrows and thrushes, or the head may be placed at the end of a long, more or less flexible neck, as in the case of the herons and flamingoes.

BILL. The bill consists of two mandibles, or jaws, which in modern birds are without teeth. The nostrils are placed in the upper mandible. The bill is usually conical, but it is modified in different species to adapt it to their respective modes of life; as the strong, hooked upper bill of the birds of prey, the short, conical bill of the seed eaters (sparrows), the long, spear-shaped bill of the herons, the pouched bill of the pelicans, the flat, shovel-shaped bill of some ducks and waders (the roseate spoonbill), the large, horny bill of some of the fruit eaters (toucan, hornbill), and the long and slender bill of the humming birds, which live on small insects and the nectar of flowers. The bill may also be straight or very much curved. Many species of water birds are provided with laminæ on the inside of the bill, through which the food is strained from the water.

WINGS. Wings correspond to the human arm and vary in form with the powers of flight. Those of the penguins are reduced to mere flippers, with small scalelike feathers, and are of use only in swimming. Those birds which are good flyers have long, narrow wings, in which the primary feathers are much elongated, as the swifts, swallows and terns. In a number of birds the wings are rounded, a feature which enables the bird to rise quickly from the ground, but does not enable it to fly far nor to soar, as the narrow-winged birds can. The wings are made up of several distinct types of feathers: the primaries, which are long and quill-like and extend from the end of the arm bone (corresponding to the hand and fingers of man); the secondaries, which extend from the middle bone or forearm (ulna); and the tertiaries, which extend from

Copyright 1912, H. M. Dixon

COMMON BIRDS

BALTIMORE ORIOLE

BOBWHITE

SANDPIPER

SCREECH OWL

ROBIN

WOODPECKER

MALLARD DUCK

BIRDS

the upper arm between the elbow and shoulder (humerus).

Legs and Feet. The exposed portion of the leg consists of the tibia, or leg bone, and the tarsus, which is a modification of the ankle bones of man. The tarsus may be short (sparrow) or very long (heron) and is covered with horny scales or plates, which vary in the different species and form valuable characters for the classification of birds. The toes or feet vary greatly with the habits of the bird. The toes of swimming birds (ducks) are more or less connected by webs, while the feet of birds of prey form claws or talons, modified to catch and to hold the bodies of animals. The femur, or thigh bone, is concealed in the body of the bird. Those birds which perch have the tendons passing over the joint between the leg and the tarsus in such a manner as automatically to close the toes on the perch when the bird sits or crouches.

Feathers. Feathers vary greatly with their location on the bird and the use to which they are put. The large, strong feathers are found in the wings and tail, and the soft, downy plumes form the covering of the body (See Feathers).

Color. The color markings of birds are almost infinite in variety, consisting of different combinations of bars, streaks, spots, dots, lines, etc. The colors include all shades of red, blue, green, yellow, gray and brown, besides white and black. The colors are due to several causes, red, brown and black being due to pigments in the feather. In green or blue there is a combination of pigment with a peculiar structure of the feather. The resplendent colors of the humming birds and pheasants, which exhibit metallic hues, are due entirely to the arrangement of the feathers in relation to the light. White, so frequently a mark in birds, is due to the presence of air cells in the feather.

Molting. One of the most characteristic features in connection with the feathers of birds is the molt, by which old, worn feathers are renewed. In young birds only the body feathers are molted the first year, the wing feathers remaining the same until the second year. Molts may be partial or complete, in the former case affecting all but the wings and tail, in the latter case, including these flight feathers. A molt takes place always in the fall after the nesting season is over, and in a few species, as the bobolink, another occurs in the spring. Two molts a year occur only in those birds which have a distinct spring and autumn plumage. As many as six plumages may be acquired by such a bird as the scarlet tanager. The male is usually more brightly-colored than the female, but in a few species, as the phalarope, the female is the brighter colored, and the male attends to incubating the eggs. In many species the brilliant colors of the male are changed in the fall to the dull colors of the female. In brightly-colored birds, the young of both sexes always resemble the female in coloration.

The Senses. The sense of sight is very keen in birds of prey and some other species, and in general it is more acute than in other animals. Good authorities state that a sparrow hawk soaring far above the ground can see a small bird at 20 times the distance that the object could be seen by a man or dog. A kite, when at an altitude beyond the reach of the human eye, can readily see a mouse, lizard or small bird on the ground, and will descend upon it in a vertical line. Birds which fly at night, as the owls, have the power of enlarging the pupil of the eye so that it will admit a large number of rays of light. Hearing is very acute, being superior to that in the lower animals, and nearly equal to that in man. Birds are not only able to hear faint sounds, but they can also distinguish a large number of sounds, as shown by the notes of their songs.

The sense of smell is also thought to be highly developed, but it is probable that birds depend more upon sight than smell in locating their food. The nostrils show several interesting adaptations. In the sparrows they are scarcely

noticeable, while in the tube-nosed swimmers, of which the fulmars are good examples, they are placed in long tubes that rest on the top or sides of the bill.

Food. The food of birds consists of almost all forms of animal and vegetable life. The perching birds catch insects, and also feed upon seed and fruit; the hawks and owls eat small Mammals and birds as well as some insects; many sea birds eat fish; plover and other waders eat Mollusks and Crustaceans; vultures eat dead animals; and the humming birds eat insects and the nectar of flowers. Many nestlings are fed by the process of regurgitation, the casting up of food partly digested by the parent.

Song. Their exquisite power of song is one of the most marked peculiarities of birds. The windpipe is wider and stronger than in other animals and usually terminates in a large cavity, which increases the sound. The lungs, too, are unusually large and are capable of such expansion as to lend additional strength to the voice. The scream of the eagle can be heard more than three miles, and the calls of geese and storks are often distinctly audible when they are beyond the range of vision. While some birds possess a voice remarkable for its powers of penetration, that of the songsters borders on the marvelous because of the great variety and intricacy of its notes. The song is indicative of joy and happiness, and is usually the bird's true call to its mate. Some birds sing throughout the year, but in the temperate regions the springtime before nesting begins is the season of song. This time the song may be a challenge to a rival, as well as a call to a mate. While there are many species of songsters, the seven given highest rank in order of preference by the best authorities are the nightingale, the blackcap, or mock nightingale, the skylark, the woodlark, the titlark, the linnet and the goldfinch.

In addition to their song, also the calls of birds are interesting, and within the species they constitute a language that is well understood, while certain calls, especially those of warning against danger, seem to be understood by all species. For instance, the alarm sounded by any bird on the approach of a hawk will instantly send all birds to shelter. The various calls are expressive of the emotions and passions common to man—love, joy, anger, fear and sweet contentment. One who has studied our common birds until he can interpret these calls comes to regard his feathered friends as real companions.

Migration. Numerous theories have been assigned for the migration of birds, but none seems wholly satisfactory. Doubtless the strongest reasons which lead to change of habitat are climate, food supply and the instinct which leads the birds to seek safe nesting places. The majority of North American birds move southward in autumn, returning to the summer haunts in the spring. Some of these migrations are short, covering only a few hundred miles, as in case of the bobolink, or ricebird, which nests in the New England and North Central states and spends the winter in Louisiana, Texas and the states bordering on the Gulf of Mexico. Others are of great length, as in case of the golden plover, which travels from the Arctic regions to Patagonia, a distance of 8000 m. Birds which migrate short distances usually do not possess sustained powers of flight, but those traveling long distances are remarkable for their speed and endurance. Some of the long-winged swimmers attain a speed exceeding 100 m. an hour, and these birds often continue in flight for several hours, sometimes covering 700 or 800 m. in a day. Sea gulls have been known to fly 200 m. and back daily in search of food, and many other instances illustrating the power of flight have been recorded.

Habitat. Birds are now found in all parts of the world, but they are most numerous in the tropics, where, also, the most brilliantly-colored species occur. Some birds are widely distributed (as the barn owl), while others are confined to more or less restricted regions, as the humming birds, which live only in America, the birds of paradise, which live only

Copyright 1912, H. M. Dixon

BIRDS OF BRILLIANT PLUMAGE

on the Island of Papua and a few adjacent islands, and the wood warblers, which are confined to America. Upwards of 15,000 species and races of birds are known, of which 1200 are found in the United States. For nesting habits see NESTS OF BIRDS.

VALUE. Next to those domestic animals which supply material for food and clothing, the birds are of the greatest economic value among the members of the animal kingdom. It is estimated that insects cause an annual loss of over $200,000,000 to the farmers of the United States, not including the damage to shrubbery and shade and forest trees. Were it not for the birds, which are the natural enemies of insects, this damage would be much greater than it now is. Because the birds now and then eat a few cherries or consume a small quantity of other fruit, many farmers have the mistaken idea that they are pests to be destroyed. On the contrary, they are among the best friends the farmer has, and should at all times be protected. See INSECTICIDE, subhead *Birds*.

By constructing bird houses for safe nesting places, by placing food where they can get it without being disturbed, and especially by maintaining a small fountain or pool of water in which they can bathe, many species of birds can be attracted to and induced to remain around the house. Not only are they of economic value, but they are likewise objects of beauty, and much pleasure is derived from watching their graceful movements. Valuable lessons may be learned from the patience, persistence, endurance and affection of a bird, and its cheerful song sends a thrill of joy to the heart of every listener.

The following works will enable the reader to acquire a good idea of the birds of the world: *Bird Guide,* Chester A. Reed; *American Natural History,* Frank H. Knowlton; *Birds of the Western United States,* Florence Merriam Bailey; *Handbook of Birds of Eastern North America,* Frank M. Chapman; *A History of the Birds of Europe,* H. E. Dresser and R. B. Sharpe; *The Birds of Asia,* John Gould; *The Birds of India,* T. C. Jerdon; *The Birds of South Africa,* E. L. Layard; *Handbook of the Birds of Australia,* John Gould.

Bird's-Eye Maple. See MAPLE.

Bird's-Nest, a curious form of fungus which, when mature, resembles tiny birds' nests with eggs. The sac containing the spores opens at the top in bowl-like form, and the circular cases of spores with their tough walls develop in the bottom of the sac like eggs in a nest. In some genera the egg, when ripe, is thrown from the nest by the action of the teeth of the bowl, aided by the formation of gases within. There are many genera which vary greatly in color. They are frequently found upon decaying boards and trees.

Birds of Paradise, brilliant birds belonging to a family nearly related to the crows and jays. They are confined to New Guinea and the adjacent islands of the Indian Ocean. They live in flocks and fly readily from one island to another. The name was given to these birds on account of their gorgeous plumage. Many years ago, when the skins of these birds first came to Europe, they were without feet, and the naturalists of that day supposed that the birds were footless, and hence they were called *paradisea apoda,* footless birds of paradise. They were also supposed to spend all their time in the air feeding on ethereal food.

The best-known species is the emerald bird of paradise, which is larger than a robin; it is chestnut or cinnamon in color, with changeable green throat; back of neck, pale gold; breast, deep purplish-brown; and tail, chestnut. The male is ornamented by many fine feathers, which droop from each side of the breast. Two black feathers without barbs, over 20 inches in length, extend from the tail. The skins of this and allied species are sold yearly for the millinery trade.

Bir'mingham, a city of England, the metropolis of one of the greatest industrial districts of the country, situated 113 m. n.w. from London. The build-

ings include the council house, the art gallery, the post office, the town hall, the Central Free Library, Queen's College, Mason College, the university, New Street Station, the Exchange, the building of the Royal Society of Artists, the county court and the military drill hall. The art collection is unusually fine, and the collection of arms is one of the most complete in the world. It was the stronghold of Puritanism under the Commonwealth. Prominent churches are St. Philip's, St. Alban's, the Edgbaston Church, the Cathedral of St. Chad and the Jewish Synagogue.

With the beginning of the 18th century Birmingham was recognized as a center of manufactures. Cotton spinning and steel making, once the important trades, have yielded to metal working, of which the chief variety is brass. Following this are jewelry, silver, gold, gilt and iron. Table glassware, buttons, pins, hooks and eyes, screws (this city has a monopoly of the English screw trade), tools, and papier-mâché goods are manufactured. The private workshop of James Watts is retained, in recognition of this city's claim to the perfection of the steam engine. The industries are not in the hands of large manufacturing companies alone, and the distance between the rich and the poor is not so marked as it is in many other cities of this type. Attention is paid to the housing conditions of the laboring class.

Birmingham was a small community during the Saxon period, and a Roman road runs north and south through the city. It has been the scene of repeated industrial and political riots. Population estimated 860,591.

Bir'mingham, Ala., the largest city of the state and the county seat of Jefferson Co., situated in the north-central part of the state, 96 m. n. of Montgomery, 168 m. w. of Atlanta and on a number of trunk lines of railway, among which are the Louisville & Nashville, the Central of Georgia, the Illinois Central, the Southern, the Mobile & Ohio, the Seaboard Air Line and the Queen & Crescent and Frisco systems. The city occupies a beautiful site about midway between the Black Warrior and the Coosa rivers and has an altitude of 600 ft. Birmingham has a delightful climate, an abundant supply of pure water and one of the best sewerage systems in the country. The surrounding country, known as the Birmingham District, embraces one of the richest coal and iron-ore regions in the United States, and the great iron industries of the city have given it the name of the "Pittsburgh of the South."

Streets and Parks. Birmingham is regularly laid out and is known as the "City of Beautiful Streets." The streets are broad and straight and about 60 m. of them are paved. The residential sections are of special interest because of the variety, architecture and beauty of the homes. The business section presents the appearance of a modern American city and has numerous buildings of the "skyscraper" type, varying in height from 10 to 25 stories. Birmingham has an excellent street-railway system, which joins together all parts of the city, its surrounding suburbs and other near-by cities in the Birmingham District. There are 16 parks. Of these, Lake View, East Lake, Avondale and the Capitol Park are especially attractive.

Buildings. Among the chief public buildings are the city hall, the courthouse, the high schools, the terminal railway station and St. Vincent's Hospital. The First National and the American Trust and Savings banks, and the Empire and Brown-Marx and the Jefferson County Bank Building are found in the business center. There are over 100 churches and many of them are superior works of architecture.

Institutions. The city maintains an excellent system of public schools. There are also within its boundaries a number of institutions of education, the Birmingham Southern University, the Medical College and College of Pharmacy; the Birmingham Dental College; a conservatory of music; a school of art; Howard College (Baptist); Northern Alabama College (Methodist); and two

colleges for colored students. Among the charitable and benevolent institutions are St. Vincent's and Hillman's hospitals, Mercy Home, Jefferson County Almshouse and a boys' industrial school at East Lake. There are also a number of other hospitals and homes designed to care for children and the aged.

COMMERCE AND INDUSTRIES. The chief industries are mining coal and iron ore and the manufacture of iron and steel and their various products. More than one-half the pig iron exported from the United States is made in Birmingham. In the city and its suburbs are a large number of extensive plants engaged in the production of steel, iron pipe, wire, nails, steel rods, machinery and foundry products. Other important manufactures include cotton goods, cement, fertilizer, brick and tile, automobiles, furniture, carriages and sewer pipe. In addition there are many minor industries. Birmingham is an important lumber market, being the second market in the country for yellow pine. Cotton and other commodities are also marketed in large quantities, and the annual volume of the wholesale trade exceeds $60,000,000.

HISTORY. Birmingham is the outgrowth of the industrial development of the South since the Civil War, though the importance of the mineral resources of the surrounding country was recognized long before. In 1871 a small smelting furnace was built and coal mining was begun. In 1880 there were 3000 inhabitants; in 1890 the number had increased to 26,000 and in 1910 it was 132,685. In 1920 the population had increased to 178,806.

Biscay, *Bis' kay,* **Bay of,** a portion of the Atlantic Ocean, washing the northern shores of the Spanish Peninsula, lying at the western foot of the Pyrenees. In width and length it extends about 400 m., and in the central part it is over 10,000 ft. deep. It receives the waters of about one-half the surface of France, but the Spanish coast is bold and rocky and forms the outlet for no important rivers. The chief ports are Nantes, Bordeaux, Bayonne, Bilbao, San Sebastian and Gijón.

Biscuit, *Bis' kit,* a thin cake, baked until crisp, and known in the United States as a cracker. The name biscuit is more properly applied to a large variety of bakery products made from dough raised with yeast. Plain biscuits, having more crust than bread, are more nutritious weight for weight, but when exposed to moisture they become moldy; hence it is essential that they be kept dry. A biscuit made almost entirely of bran is called a digestive biscuit, and those containing about ten per cent of charcoal are termed charcoal biscuits. There is a biscuit containing finely-chopped meat, called meat biscuit, and a large, hard cracker, called sea biscuit. See BREAD.

Bishop, an officer who acts as superintendent over a number of churches which constitute his diocese. The Roman, Greek, Anglican and Methodist Episcopal churches have bishops. In the first three the officer is considered to have descended from the apostles. In the Methodist Episcopal Church bishops are elected by the General Conference. The duties of a bishop vary in different denominations. In general, he has supervision of the churches and clergy in his diocese. He is also the leader in the great religious movements of his denomination in the churches under his charge.

Bismarck, *Biz' mark,* **N. D.,** a city, county seat of Burleigh Co. and capital of the state, 194 m. w. of Fargo, on the east bank of the Missouri River and on the Northern Pacific and the Minneapolis, St. Paul & Sault Ste. Marie railroads. The city is attractively situated, and is a trade center for a large agricultural district and the base of supplies for United States military posts and Indian agencies. Bismarck is the headquarters for navigation of the upper Missouri, and it has a heavy river traffic with ports above and below the city. A magnificent bridge spans the river at this point. Among the prominent public buildings is the capitol building, completed in 1894 at a cost of $500,000. Other public

buildings include the courthouse, city hall, a state library, banks, theaters and numerous churches. The city also contains the state penitentiary, a United States Government Indian School, St. Alexius Hospital and the Bismarck Hospital. There is an excellent system of schools, including St. Paul's Seminary. Ft. Lincoln, a United States army post, is located about a mile south of the city.

Bismarck has a large wholesale trade in grain, hides, wool, furs and coal. Among the industrial establishments are flour mills, foundries and machine shops, a cordage plant and grain elevators. The first settlement was made in 1873, and three years later a city charter was granted. In 1883 it was made the capital of Dakota Territory, on the division of which it became the capital of North Dakota. The city has the commission form of government. Population in 1920, 7,122.

Bismarck-Schönhausen, *fon Bis'mark-Shon' hou"zen,* **Otto Eduard Leopold von,** PRINCE (1815-1898), a famous statesman, "Iron Chancellor" of the German Empire, born at Schönhausen, of noble family. He received his education at Göttingen and Berlin, served his regular term in the army, and spent some time looking after the management of his ancestral estates. In 1847 he became a member of the Prussian Diet. Four years later he was appointed delegate of Prussia in the Diet of the German Federation, where almost continuously for eight years he displayed the highest diplomatic ability in his efforts to establish the leadership of Prussia among the German states as against the claims of Austria, at that time the dominating influence in the German Federation. Indeed, Bismarck's fixed purpose soon came to be the establishment of a great German nation, with Prussia at its head, and to this end he devoted the best energies of his life.

From 1859 to 1862 he was ambassador to Russia and strengthened the relations between that country and Prussia. After serving for a few months in 1862 as ambassador to France, during which time he made an official visit to London, he returned to Germany to become minister of foreign affairs and president of the Prussian cabinet. Upon refusal of the lower house to pass his bill for the reorganization of the army, Bismarck dissolved the Diet and governed without the assembly for four successive sessions, until the work of reorganization was completed. This caused great popular excitement, which was diverted, however, by the controversy with Denmark, resulting in the annexation of Schleswig-Holstein. Soon afterwards the Seven Weeks' War with Austria, terminating with the triumph of Prussian arms at the Battle of Sadowa in 1866, gave Prussia the ascendancy which it had sought, and paved the way for the reorganization of Germany under the guiding spirit of Bismarck, with Austria excluded. Bismarck became the most popular man in Germany.

The unfriendly feeling already existing between Germany and France was intensified over the question of the Hohenzollern accession to the Spanish throne, and led to the Franco-German War in 1870-71 (See FRANCO-GERMAN WAR). As a result of the victories of her armies, Germany annexed Alsace-Lorraine, received a cash indemnity of $1,000,000,000, King William of Prussia was proclaimed Emperor of Germany and Bismarck was made prince and chancellor of the new empire. Bismarck now further strengthened the position of Germany by entering into the Triple Alliance with Austria and Italy. He turned his attention also to internal affairs, including the enlargement of the army and navy, tariff regulation, civil service reform and State control of railroads. He advocated the establishing of German colonies to increase the commerce and power of the empire. He presided at the Berlin Congress in 1878, the Berlin Conference in 1880 and the Congo Conference in 1884.

In 1890, owing to differences with Emperor William II, Bismarck resigned the chancellorship and retired to his estates

at Friedrichsruh, but continued to influence European politics. His 80th birthday was observed by half of Europe and was made the occasion of a great demonstration in his honor, including a visit by the Emperor. He was indeed a great statesman, but to properly estimate his work, we must use the perspective of history. We now see that in building Germany he left an impress on German life, thought, and feeling that finally culminated in the European War of 1914, and the ideals for which he toiled, finally embodied in the German Empire, represent a line of development, greatly different from the ideals of Washington.

Bismuth, *Biz' muth,* a reddish-white, brittle metal, which is found free in nature or in combination with sulphur and oxygen. It is obtained from mines in California, South America, Spain and Norway. Pure bismuth is not in great demand but is used principally as an alloy of lead, in which it gives to the lead the power of fusing easily. All of its alloys have the general name *fusible metals* from this characteristic. They are used in making type metal and as solder in pewter manufacture. Its compound with nitrogen and oxygen is used in medicine, and with chlorine it is a cosmetic, called pearl-white. Bismuth is also a constituent of sympathetic ink. Bismuth is a member of the same group of elements as antimony, and like antimony is a poor conductor of heat and electricity.

Bi'son, or American Buffalo, a name given to two species of the Bovine Family, one known in Europe and the other once widely found on the American plains but now practically exterminated. The bison differs mainly from other members of this family in having a noticeable hump upon the shoulders caused by projections of the spine, to which are fastened the strong muscles that support the heavy head. The forehead and shoulders are protected by a shaggy growth of hair which serves as a defensive cushion in the deadly combats which occasionally take place between two ferocious bulls. In winter, bison are a dark reddish-brown color which fades to gray when the fur falls in summer. The horns are small and set wide apart, though the original bison had large, heavy ones.

The American bison are comparatively harmless and much less fierce than the European, probably because they have had fewer wild beasts to fear and to protect themselves against. They traveled in great herds across the prairie before the settlement of that section, and their paths of migration formed roadways for many an immigrant train. Their use in furnishing food and clothing to both Indian and settler has decimated these vast herds until, as recorded

BITTERN

by an investigation in 1919, there are only about 6000 in parks or protected by law, and probably not more than 400 living wild upon the plains. The herds carefully protected by the government are located in Yellowstone National Park and Glacier National Park. In the national parks of Canada are also several

herds under the protection of the Dominion Government.

Bit'tern, a bird of the Heron Family. The American bittern is from two to almost three feet in length, and is mottled and streaked with brown and buff; the top of the head is bluish-slate. This peculiar bird, with its long bill and legs, is more or less solitary in habit, dwelling mostly where the cat-tails and rushes afford ample protection. The large bittern is known under several very appropriate names, such as "thunder-pumper" and "stake-driver," due to the peculiar booming or pounding noise which it makes in the nesting season. This sound is produced by inflating the throat, which is very elastic, and forcing out the air with a gulping motion. The sound resembles the syllables "plum-puddn," or "ump-up," uttered in a gutteral tone. The nest is large and is placed on the ground or on a small hillock in swampy places, and contains three to six brownish-drab eggs. The young bitterns are covered with white down

Bit'tersweet", a climbing shrub belonging to the Nightshade Family, a native of Europe, Asia and northern Africa and possibly of the United States. The plant is found in moist grounds, spreading over heaps of stones or climbing along fences. The stems are quite woody at the base, but become vinelike as they branch, and are smooth throughout their length. The leaves are smooth and dark green in color. The upper ones are heart-shaped, while those near the flowers are often arranged in pairs or in threes, with one large leaf and one or two smaller ones at its base, giving it the appearance of a single halberd-shaped leaf.

The flowers of the bittersweet are particularly noticeable from the manner in which the sepals are bent back, while the stamens protrude, though adhering closely together, thus giving the blossom a peculiar pointed effect. The corolla is a pale red-violet, with a pair of dark green dots at the base of each lobe. The flowers are in clusters and are followed by clusters of bright red, oval berries. All parts of this plant, except the berries, which are harmless, contain a poisonous compound called solanine; the berries have a sweet taste, but the solanine gives the leaves and stems a bitter, burning taste; hence the name bittersweet. Bittersweet is also known as nightshade, scarlet berry, poisonberry and violet bloom.

False Bittersweet, or Shrubby Bittersweet. This is an American twining shrub of the Staff-Tree Family, often called simply bittersweet. Is has thin, pointed, finely-toothed leaves, and clusters of greenish-white flowers. The

BITTERSWEET

fruit is an orange-colored pod which appears early in the autumn and soon breaks open, disclosing the seeds with their scarlet coating, called an aril. This bright combination of color makes the clusters of seed pods very attractive, and because they will remain on the stem over winter they are often used for decorative purposes. This false bittersweet grows from Ontario as far south as North Carolina and west to northern New Mexico. It is not at all poisonous and its bark is used for medicinal purposes.

Bitu'men. See Asphalt, *As' fahlt.*

Bizet, *Be" zeh'*, **Alexandre César Léopold** (1838-1875), a French operatic composer, born at Bongival, near Paris, the son of a singing master. He studied at the Paris Conservatory and later in Italy, taking many prizes. The larger part of his work is in the form of opera of the highly romantic type, *Carmen* being his crowning achievement, which brought a belated recognition.

Björnson, *Byurn' son,* **Björnstjerne,** *Byurn' stern* (1832-1910), a Norwegian poet, dramatist and novelist, born at Kvikne. After studying at the University of Christiania he turned to literature, publishing his first drama in 1857. In 1857-59 he was director of the theater in Bergen, and from 1860 to 1863 traveled, chiefly in Italy. Thereafter he lived in Norway, but made frequent journeys to Paris, Rome and Munich, and in the winter of 1880-81 lectured in the United States. For over 30 years he had been a leader of the Republicans in Norway and had taken an active interest in social and religious controversies. In 1903 he received the Nobel prize for literature. He was distinctively Norwegian in both his peasant tales and dramas, and enjoyed wide national popularity Among his novels are *Synnöve Solbakken, Arne, A Happy Boy, The Fisher-maiden, Dust* and in *God's Way*. He also wrote the dramas *Mary Stuart in Scotland, A Gauntlet, Geography and Love, Sigurd the Crusader* and the magnificent ode *Bergliot*.

Black, William (1841-1898), a Scottish novelist, born in Glasgow. Through journalism he entered upon his career as a novelist, serving as war correspondent to the London *Morning Star* and on the editorial staff of the *Daily News*. He is at his best in stories of the Scottish Highlands. His novels show more than ordinary workmanship and *A Daughter of Heth* reveals talent of a very high order. Among other works are *A Princess of Thule, Green Pastures and Piccadilly, Madcap Violet, Macleod of Dare, Shandon Bells, White Heather* and *In Far Lochaber*. He also wrote the life of Oliver Goldsmith for the *English Men of Letters* series.

Black'berry, a fruit-bearing shrub of the Rose Family, whose berries are among the favorite American small fruits. The vines thrive well on any well-drained soil, but their quality is greatly improved by care and attention. They should be pruned every spring by removing all weak and diseased stems and cutting the outer ones back about one-third of their length. In the late summer after the fruit has been gathered, all of the stems should be cut out. The fruit of the blackberry under cultivation is a plump, juicy berry rather longer than that of the raspberry and more solid. The white blackberry, developed by Burbank, is exactly like the cultivated blackberry, except for its color, which is a pleasing creamy- or pinkish-white. The stems of this new species are thornless. The favorite types of blackberries are the Early Harvest, the Agawam and the Lucretia.

Black'bird, a bird of the Blackbird Family. The red-winged blackbird is eight to ten inches in length, or about the size of a robin, and is usually associated with swamps where grow the cat-tails, upon which the open, large, well-constructed nest of grass is fastened. While the black, red-shouldered male is perched on a near-by tree watching for intruders, the brown-streaked female is incubating the four or five bluish, black-streaked eggs. Two broods are raised annually. The peculiar call note sounds like the syllables "con-quer-ee," sung in an ascending key. In the autumn the redwings gather in flocks and spend the nights together in large "roosts." In the winter the males and females form separate flocks, the males migrating northward in the spring in advance of the females. The value of this bird as a destroyer of insects far outweighs the little damage it does to the farmers' grain.

Black Death. See PLAGUE.

Black'foot, a tribe of North American Indians formerly ranging from the Yellowstone to Hudson Bay and west to

the Rockies. They received their name from the whites, who observed their leggings blackened by the freshly-burned grass of the prairies. Five thousand are at present in Canada or in the Montana reservations.

Black Forest, a heavily-wooded mountain range in the southwestern part of Germany, so called by reason of the dark foliage of the firs and pines. It runs generally from south to north and covers the southern part of Baden and the western part of Württemberg. It is the source of the Danube and the Neckar and contains important lakes. There are abundant mineral springs, but the mineral resources, including silver, copper and cobalt, are not significant. The highest peak of the Black Forest is the Feldberg (4900 ft.). Because of its depth and mysterious darkness, numerous legends, folk tales and superstitions are associated with the Black Forest.

Black Hawk (1767-1838), a Pottawattomie Indian, one of the most noted chiefs of America, born at Kaskaskia, Ill. He was a successful leader against the Osage and Cherokee tribes, and upon his father's death, succeeded him as head chief of the Sacs. The American purchase of Louisiana in 1803 was followed by attempts to secure the removal of those Indians living along the east bank of the Mississippi. By a treaty signed at St. Louis in 1804 they agreed to this; but Black Hawk affirmed that the Indians were drunk when they signed the treaty, and refused to comply with its terms. He joined Tecumseh and the British with 500 warriors during the War of 1812, but soon withdrew. In 1816 he signed a treaty at St. Louis, agreeing to cede the lands east of the Mississippi, and was ultimately forced to cross the river. But in 1832 he opened the Black Hawk War by the massacre of white settlers in northern Illinois. In the brief but exciting conflict that followed, Abraham Lincoln, Jefferson Davis and others subsequently prominent in American history bore a part. Black Hawk and other captured chiefs were confined at Fortress Monroe for some time, but later were permitted to locate in Iowa with their tribes. A monument at Stillman Valley, Ill., a concrete statue near Oregon, Ill., and the Iowa county which bears his name keep green the memory of this sturdy and irreconcilable foe of the white man.

Black Hills. See SOUTH DAKOTA, subhead *Surface.*

Blackmail, a term which originally meant the payment of a sum to robbers and marauding bands in order to secure freedom from their depredations. The custom was common at one time in England and Scotland. In modern use the term refers to money extorted under threat of exposure of a real or alleged offense.

Black'more, Richard Doddridge (1825-1900), an English novelist, born in Longworth. He turned from law to literature, and shortly after 1860 retired to a fruit farm near Twickenham, where he lived until his death. His novel *Lorna Doone* brought him belated fame, and with its romantic atmosphere, its bluff and sturdy country types and its adventurous spirit, became recognized as a classic of the West country. His other novels are practically forgotten. Among them are *The Maid of Sker, Springhaven, Alice Lorraine, Mary Anerley* and *Kit and Kitty.*

Black Mountains, a mountain range of North Carolina, containing some of the highest peaks east of the Rocky Mountains. The beautiful scenery, broad forest slopes and clear streams have made this region popular with campers and tourists. Asheville, N. C., is but 18 m. from Mt. Mitchell, the highest peak of the Black Mountains and of the Appalachian system. Other noted summits are Balsam Cone, Mt. Buckley, Cattail Peak, Deer Mountain and Chimney Peak.

Black Prince (1330-1376), the name usually applied in history to Edward, Prince of Wales, the son of Edward III. His popular name referred to the black armor which he wore in battle. He fought gallantly in the Battle of Crécy when but 16 years of age, and at 26 de-

feated the French in the Battle of Poitiers. He died before he could assume the kingship, but his son became King Richard II.

Black Sea, an inland body of water, lying between eastern Europe and Asia Minor, and connected with the Mediterranean by the Bosporus, the Sea of Marmora and the Dardanelles. It extends 750 m. from east to west, has a greatest width of 380 m. and a greatest depth of over 7000 ft. There is an absence of deep-sea life, no organisms being known to exist below 100 fathoms. The rivers which fall into it, including the Danube, Dniester, Dnieper and Don, drain the greater part of central Europe. The important ports are Odessa, Poti, Batum, Sebastopol and Trebizond. It is the outlet of the important agricultural region in the southern part of Russia. There is also railway communication with the Caspian Sea. The Black Sea was the Euxine of the ancients.

Black Snake, one of the large nonvenomous racers of the Colubrine Family, found in both Europe and America. It is not a large snake and does not, as was once supposed, crush its prey; instead it holds it between itself and the ground, swallowing it rapidly. Its choice of food is the small wood Rodents, as squirrels, gophers, etc. The black snake has large eyes, a smooth-scaled skin and a long tail. The largest of the species attain a length of six feet. The eggs are a speckled white and the young are at first gray in color.

The blue racer, common in the United States, is a pale variety of the black snake, and another species, the pilot, or mountain black snake, is found in the mountains of the Eastern States. The Australian purple death adder of the Elapid Family is also known as the black snake.

Black'stone, Sir William (1723-1780), an eminent writer on English law. He was educated at Oxford and held a fellowship of All Souls' College, Oxford, in 1744. Two years later, when called to the bar, he gained neither attention nor practice, but in 1753 he gave a course of lectures at Oxford on the English law, that were very successful. A few years later he was appointed law professor at Oxford, and the doctrines which he taught were so pleasing to the Tories that he was made, in 1761, a king's counsel, and, shortly after, principal of New Inn Hall, Oxford. Honors now followed quickly, and two years later he was made solicitor-general to the Queen. In 1765-69 Blackstone published his great work, the celebrated *Commentaries on the Laws of England,* and as his practice was now large, he gave up his Oxford appointments. In 1770 he was knighted and became a justice of the Court of Common Pleas. His *Commentaries* have become classic and are studied by all law students in England and America.

Black'well, Elizabeth (1821-1910), the first woman to secure a medical diploma in the United States. She was born in Bristol, England, and came to America with her parents in 1832. She lived first in Cincinnati, where, after the death of her father, she aided in the support of the family. When she resolved to take up medicine she found the doors of all medical schools closed to women, so began her study under private instruction. Later she gained admission to the Geneva Medical College, New York, where she graduated in 1849 at the head of her class. After pursuing her work in Paris, she, with her sister, Emily, established in New York the first hospital in the United States conducted entirely by women. Dr. Blackwell was the originator of the organization now known as the National Sanitary Aid Association, which helped to train nurses for the Civil War, and she founded the Woman's Medical College of the New York Infirmary, now merged with Cornell Medical College. Later, in London, she assisted in founding the National Health Society of London and the London School of Medicine for women. Dr. Blackwell was a lecturer and writer of ability.

Blad'derwort, a water or bog plant belonging to an interesting family of the

same name. Its name is derived from the small bladders, or air cells, found upon the leaves at the base of the stem, by means of which it is able to float upon the water. After the flower has developed, the air escapes and the plant sinks to the bottom of the stream, where the seeds ripen. These plants may or may not have roots, but if rooted they are generally near the banks of a stream, where they can be set free by wind or wave. The flowers are yellow or purple, irregular in form, and occur in numbers of from one to twelve on a stem. The stem leaves are scalelike. There are over 100 species, 20 of which may be found in the United States, mostly in the South and East. The plant flowers all summer. See BUTTERWORT.

Blaine, James Gillespie (1830-1893), an American statesman, born at West Brownsville, Pa., of Scotch-Irish parentage. He early showed marked mental ability and graduated from Washington College at the age of 17. He taught school for a few years, married at the age of 20, studied law and in 1854 went to live in Augusta, Me., where he became editor of the Kennebec *Journal*. In this work he was successful, and in 1857 he became editor of the Portland *Advertiser*.

Upon his removal to Maine, Blaine entered at once upon the discussion of the vital public questions at issue, and soon became a leader in the state. He entered enthusiastically into the movement for the formation of the Republican Party, and was a delegate to the first Republican convention in 1856. He was elected to the State Legislature in 1858, where he served for four years, two years as speaker. In 1862 he was elected to the House of Representatives, of which body he was speaker from 1869 to 1875. He entered the Senate in 1876 and served for five years.

Blaine's ability and distinguished service in Congress made him a prominent candidate for the presidential nomination in 1876 and again in 1880, but both times he was defeated. In 1884 he became the Republican candidate, but was defeated at the polls by Cleveland. President Garfield appointed him secretary of state in 1881, but he resigned in December of the same year on account of Garfield's death. He was again appointed secretary of state by President Harrison in 1889. This office he filled with great ability. He resigned in 1892 and again became a candidate for the presidential nomination, but was unsuccessful.

Blaine was a man of keen intellect, remarkable memory and impassioned eloquence. He was one of the best debaters in Congress. He was a strong advocate of the Union cause, of equal political rights for the negro, of peaceful relations among the nations of North and South America and of reciprocity in trade with foreign nations. He wrote *Twenty Years of Congress*.

Blair, Francis Preston, Jr. (1821-1875), an American soldier, son of Francis Preston Blair, the journalist, was born in Lexington, Ky. After graduating from Princeton in 1841 he studied law and was admitted to the bar in 1843, when he began to practice law in St. Louis. He served as a private in the Mexican War, after which he became editor of the *Missouri Democrat*. From 1852 to 1856 he was a member of the Missouri Legislature, and was then elected to Congress. He was reelected in 1860 and 1862. By his activity and influence at the beginning of the Civil War he helped to preserve Missouri and Kentucky to the Union. Entering the army as a colonel of volunteers, he was made brigadier-general in 1861, and major-general in 1862. He commanded a division at Vicksburg, led his men at Lookout Mountain and Missionary Ridge, and marched with Sherman to the sea. After the war he joined the Democratic Party because of the reconstruction policy of the Republican Party, and was nominated for vice-president in 1868 on the ticket with Horatio Seymour. In 1870 he was elected to fill a vacancy in the Senate, but failed of reelection in 1873, and retired to private life.

Blair, Montgomery (1813-1883), lawyer and statesman, born in Kentucky,

son of Francis Preston Blair, the journalist. He graduated from West Point in 1835, served in the Seminole War, and became mayor of St. Louis in 1842. He was counsel for the defendant in the famous Dred Scott case of 1857, and became noted as a constitutional lawyer. President Lincoln appointed him postmaster-general, and his term is notable for the introduction of free delivery of mail in cities and the use of money orders. He resigned in 1864.

Blake, Edward (1833-1912), a Canadian lawyer and statesman, born in Ontario. He graduated from the University of Toronto in 1854 and two years later was admitted to the bar. Having entered the Canadian Parliament as a Liberal in 1867, in two years he was leader of his party in his province, and in 1871 was premier of Ontario. Later he was a member of Mr. Mackenzie's cabinet. In 1875 he was appointed minister of justice, subsequently, from 1878 to 1887, being leader of the Liberals in the House of Commons. At the request of the Irish Parliamentary Party, in 1892, he accepted a seat in the British House of Commons, where he remained till 1907, doing much to popularize the cause of Home Rule. Meanwhile, in 1896, he became a privy councilor. According to Lord Roseberry, Mr. Blake was "the most brilliant orator and one of the most capable statesmen of Canada."

Blake, Robert (1599-1657), a British admiral, born at Bridgewater, Somerset. He lived quietly as a country gentleman until he was about 40 years of age, when he was sent to Parliament, where he at once distinguished himself. Upon the outbreak of the Civil War between the King and Parliament, he sided with Cromwell, raised a company of soldiers and defended Taunton against the Royalists. In 1649, having been made one of three to command the fleet, he destroyed the squadron of Prince Rupert and secured important districts from the control of the Royalists. In recognition of his services Blake was made admiral of the fleet. Beginning a struggle with the Dutch, who were then masters of the seas, he defeated Van Tromp in 1653, and soon established English supremacy. In 1654 he was sent by Cromwell into the Mediterranean, where he caused the British flag to be respected. His last exploit was the destruction in 1657 of 16 Spanish ships in the harbor of Santa Cruz, where they were defended by a castle and half a dozen forts. He died on his way home to England.

Blake, William (1757-1827), an English poet and painter, born in London. He manifested an early interest in art, studied at the Royal Academy and was soon engaged as an engraver for booksellers. His own poetry he illustrated with etchings and drawings of singular originality and beauty of design. He was troubled with strange and haunting illusions to such an extent that his sanity was often questioned. The greatness of his mind, however, left a deeper impress on his work than did its frailties. In *Songs of Innocence* and *Songs of Experience* there are poems worthy of a place with the best of their kind in our literature. His series of engravings in illustration of the *Book of Job* combine the most skillful technique of workmanship and the happiest exercise of his imagination.

Blanc, *Blahn*, **Jean Joseph Louis** (1811-1882), a French publicist, historian and socialist, born in Madrid. He attended the college at Rhodez and studied law in Paris. After serving for a time as attorney's clerk, and then as private tutor, he devoted himself to journalism. In 1839 he founded in Paris the *Review of Progress,* in which first appeared his great work on socialism, *The Organization of Labor* (published separately in 1840). In this work he condemns the competitive system and advocates an industrial democracy, in which each member shall render service according to his ability and be recompensed according to his needs. This work placed him among the foremost socialists of the day. He next published his *History of the Ten Years, 1830-40,* which "acted like a battering-ram against the bulwarks of royalty in France." At the outbreak of the

Revolution of 1848 he was elected a member of the provisional government and was appointed president of the labor commission. After the June insurrection he was prosecuted for conspiracy, but escaped to England, where he remained until the fall of the empire. He then returned to France, and in 1871 became a member of the National Assembly. While in exile he completed in 12 volumes his *History of the French Revolution*. He also wrote *History of the Revolution of 1848*.

Bland, Richard Parks (1835-1899), an American statesman, born in Kentucky. He removed to Missouri in 1855, then to California and later to Nevada, where he was admitted to the bar in 1860. In 1865 he returned to Missouri and practiced law. He was elected to Congress from Missouri as a Democrat in 1872 and served until his death, except for the term 1895-7. In 1875 he became chairman of the committee on mines and mining. He favored the free coinage of silver and was the author of the well-known "Bland Bill," authorizing the coinage of not less than 2,000,000 silver dollars monthly.

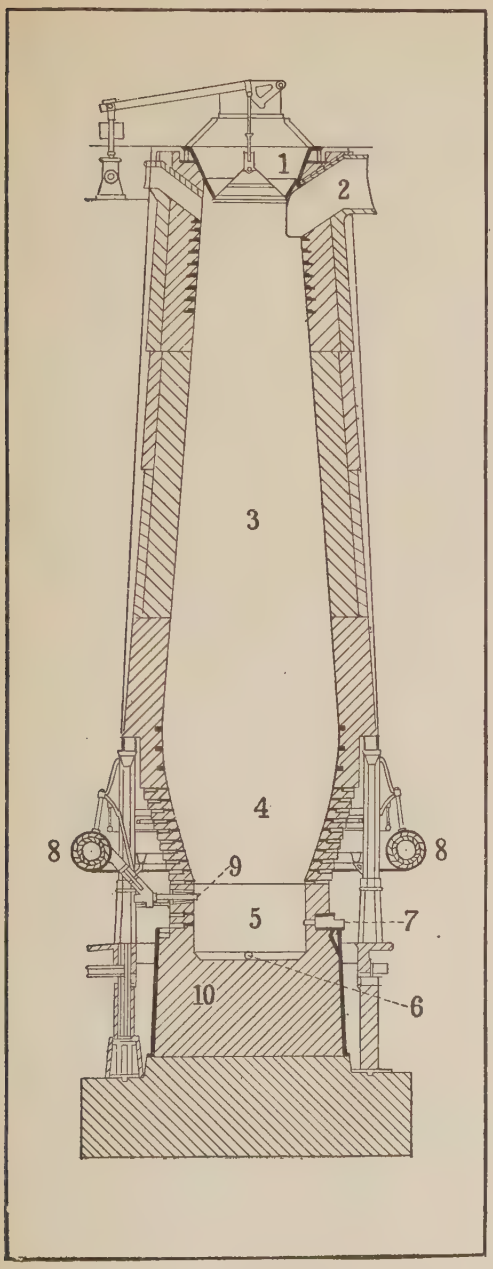
Blash'field, Edwin Howland (1848-), an American mural and figure painter, born in New York City. He studied in Paris under Bonnat, and for 20 years worked in France, Italy, Greece and Egypt. In 1881 he returned to the United States and has since occupied an important place in American art. He is a member of the National Academy and has been president of the Society of American Artists. The best known of his figure pieces are *Christmas Bells* and *The Angel with the Flaming Sword*. His principal works, however, are his mural decorations on a large scale. Chief among them are the large panel in the Appellate Court, New York, the central dome of the Congressional Library at Washington, the decorations of the Baltimore Courthouse. In collaboration with his wife, he has written several important volumes of description and art criticism, chief among which are an English edition of Vasari's *Lives of the Painters* and *Italian Cities*.

Blast Furnace, the name given to a furnace for smelting iron ore and obtaining iron by means of a high-pressure air blast. This blast is produced by blowing engines, generally operated by steam, and this air is heated in iron retorts to a temperature of from 600° to 900° F. It is supplied to the pipes, called tuyeres, situated in the lowest part of the furnace near the hearth. The part next above the hearth is conical in shape and is called the boshes. The interior is sometimes continued upward as a straight cylinder, and sometimes in a tapered form or cone, the whole of which is surmounted by an opening for introducing the materials.

The exterior of the furnace is of stone or fire brick, the body being lined with fire brick, generally in two shells, one within the other, having the space between filled with sand, ground clay, etc., to provide for expansion and contraction, and, furthermore, to hinder loss of heat by radiation. Around this exterior are a number of bands of steel hoops or plates to hold the masonry together more securely. In the boshes and where the greatest amount of heat exists, a particularly strong fire brick is used. The hearth is lined with larger bricks or stone specially made for the purpose. Around the top of the furnace is built a gallery, and the materials for charging are hoisted to it by an elevating device. The charges are fed into the top of the furnace so as to keep it filled; and as each layer melts down and is removed, other charges are made. These consist of ore, fuel and limestone. Heated air is blown into the tuyeres through the hearth and strikes the charges as they are deposited. The intense heat, coming in contact with the gases escaping upward through the mouth, sets the iron free, and this drops down into a lower and hotter part of the furnace, where it melts. The limestone and earthy matter of the ore become united, forming a cinder or fluid slag, floating on top of the melted iron. When a sufficient quantity accumulates, the slag

is thrown away, and the iron is drawn off and cast into sand molds, called sows and pigs, hence pig iron.

In the cut, 1 is the charging hopper; 2, the gas take-off; 3, the stack; 4, the boshes; 5, the hearth; 6, the tap hole for iron; 7, the slag tap; 8, the tuyeres; 9, the ground level; and 10, the water-cooled hearth.



BLAST FURNACE

Great and important improvements have been made in smelting iron, which not only have increased the output but made it possible to apply greater intensity of heat, thereby insuring more economical operation. The hot gases which formerly escaped are now utilized in heating the air; and as a source of power under steam boilers, or, after being washed, in cylinders of internal-combustion engines. Automatic dumping cars to hoist the charges are now generally employed. The heights of blast furnaces have been increased from 75 to 100 ft., the diameters usually being one-third the height. A modern blast furnace produces from 300 to 600 tons of pig iron daily, and requires from 1000 to 2000 tons of material, ore, fuel and limestone. Its total cost for construction, with its complete equipment, including blowing engines and trackage, etc., will range from $400,000 to $800,000. See IRON AND STEEL; FOUNDRY.

Blasting, a technical term for breaking up any object by means of an explosive, like gunpowder, dynamite and nitroglycerin. The operation is used extensively in quarrying and mining. It is ordinarily performed by boring a small hole into a rock in which the explosive is introduced. The hole is then tamped or filled up with clay or sand. The charge is then exploded by a fuse or electric current. See DYNAMITE; GUNPOWDER; NITROGLYCERIN.

Bleaching, the process of whitening, usually applied to the art of removing the yellow color from new cotton cloth, linen, silk, etc. The ancient Babylonians, Egyptians and other ancient peoples employed the method of repeated wettings in a weak lye and sun drying. Linen requires longer treatment in this way than cotton, and the early British and Scotch weavers sent their fabrics to Holland, where a year or so was required to bleach them. Hence they were known as *hollands*. Grass bleaching, or croft-

ing, is still practiced in Scotland and Ireland. It consists of a number of boilings, rubbings and lye baths, besides exposure of the goods on a grassy soil to sun and air for many weeks. Fabrics bleached in this way were formerly called *lawns*.

Modern methods are now employed in all bleacheries, and consist of boiling, steeping and washing in chlorine water, and afterwards in lye and artificial drying, all requiring extensive buildings and special machines. Wool and silk fabrics are usually bleached in a closed room by means of sulphurous-acid fumes generated in stoves in which sulphur is burned. When these fabrics are subjected to frequent washings in soap containing potash, the natural color of the fabric reappears; they grow yellow. Unbleached cottons, formerly so common, have given way to bleached goods, which by the modern process of bleaching are placed upon the market at only a slight advance in cost over the old unbleached goods.

Blenheim, *Blen' im,* a village of Bavaria, 23 m. n.w. of Augsburg. Here the English under the Duke of Marlborough and Prince Eugene won a victory over the French and Bavarians Aug. 13, 1704. The victory, which was a brilliant one, caused great enthusiasm in England. This battle is the subject of Southey's *Battle of Blenheim.*

Blen"nerhas'sett, Harman (1764-1831), an English-American, remembered chiefly for implication in the plot of Aaron Burr to establish an empire in the Southwest. He was born in Hampshire, England, was educated at the University of Dublin and in 1797 came to America with an ample fortune. Having settled on an island in the Ohio River, nearly opposite Marietta, he there entertained Aaron Burr in 1805 and was tempted into joining his conspiracy. When the scheme failed, Blennerhassett was prosecuted but discharged, though he and his wife were practically fugitives and finally lost all their property. He had successively tried cotton planting near Port Gibson, Miss., practiced law in Montreal and removed to the West Indies, before he returned to England, where he died on the Island of Guernsey. See Burr, Aaron.

Blight, *Blite,* any disease or injury to plants brought about by insects, fungi or other causes and resulting in the wilting or dying of the whole or any parts of the plant. The botanist always uses the name to refer to several kinds of fungus disease, chief among which are those affecting pears and potatoes. Pear blight is often also known as fire blight because the twigs look as though scorched and withered; the leaves also turn black and die, but remain hanging on the limbs. The bacterium which causes the disease lives in the affected part of the tree; in the spring when the sap rises, a milky liquid, which carries millions of these minute animals, oozes from cracks in the bark. Insects spread them to the nectar cups of flowers, where they develop and enter the twigs again. All infected branches should be removed and burned and wounds upon the tree should be disinfected with one part of corrosive sublimate in 1000 parts of water. Spraying does little to destroy this blight.

The blights that affect potatoes are of various kinds. Some are caused by beetles, some by fungi and some by lack of moisture in the soil. The first two kinds may be remedied by spraying with Bordeaux mixture (See Fungicide), if begun early and carried on thoroughly. Deep plowing, frequent cultivation and enrichment of the soil with humus prove effective for the latter.

Several other plants are attacked in a similar manner. The leaves of young pea seedlings often blacken and die; plum and cherry leaves, especially those of the morello cherry, become purple-spotted and decay in those spots; finally the entire leaf curls and falls. Strawberry plants are equally susceptible. Dusky, moldy patches appear upon the leaves, finally completely covering them and thus destroying the shade, so that the fruit, and, later, the entire plants are poor in quality. These three diseases may be successfully combated by spraying the trees or plants with dilute Bor-

deaux mixture and destroying all of the fallen leaves.

Celery, maize, chrysanthemum plants, maple trees, mango trees and tea plants are variously affected by blights. The most of these may be checked by removing affected twigs as fast as the disease makes its appearance. Mango leaf blight has been seen to follow in the wake of aphids and scale insects and may be destroyed by removing them. See APHID; INSECTICIDE.

Blind, Education of the. A book emphasizing the duty of the people to educate the blind was published in both Italian and French as early as 1646. However, until the education of the deaf had been proved feasible, efforts in behalf of the blind met with slight encouragement, although Rousseau and others had endeavored to stimulate interest in the subject (See DEAF AND DUMB, EDUCATION OF THE). But in 1784 Valentin Haüy opened a school for the blind in Paris. In 1791 a similar school was opened in England. Within a few years Europe had a total of 20, and the results were both encouraging and astounding.

Among American institutions of this character, the New England Asylum, chartered in 1829 and opened at Boston in 1832, was the first incorporated. The New York Institution for the Blind, chartered in 1831, was the first to open its doors; while a Society of Friends opened the Philadelphia institution in 1833. It was greatly to the advantage of the New England Asylum that Dr. Samuel G. Howe, who was chosen director, had already supplemented his medical training, received at Harvard, by broadening experiences and professional studies in Europe. Moreover, immediately after his selection for the peculiarly exacting duties of this new field, he had gone again to Europe for such knowledge as personal inspection alone could give concerning the best of their institution for the blind.

Like the first American school for the deaf, in Connecticut, this Massachusetts school received state aid from the first. Like the Connecticut institution also, it for some time received numerous pupils supported by legislative appropriations of other states. Under the able direction of Dr. Howe, which continued for 45 years, the New England Asylum, now long known as the Perkins Institution for the Blind, became the greatest school of its character in the world. The public exhibitions given by its pupils, and particularly those given before some 17 state Legislatures, did much to stimulate the establishment of similar schools in other commonwealths; and the successful education of blind deaf-mutes, such as Laura Bridgman and Helen Keller, by its methods, has given the Institution world-wide fame.

The approximately 70 American state schools of today report about 550 teachers and 5500 pupils. Their libraries contain some 35,000 printed volumes, for the use of teachers, and more than 80,000 volumes in raised type for their pupils. They control properties valued at about $10,000,000 and expend more than $1,500,000 per annum.

In general, the American schools aim to give their pupils practically the same literary training as other children receive in city graded and high schools. Those who show special aptitude are given greater opportunity in both vocal and instrumental music. A printing establishment maintained by the Perkins Institution, and another at Louisville, Ky., which receive regular appropriations from Congress, furnish material of many sorts. The American Braille and the New York point systems are now in very general use, and are perhaps most successful. By these systems, raised points represent the sounds for which we ordinarily use letters; just as various other symbols serve the telegrapher and the stenographer, and flashes of light, the operator who sends messages over the submarine cables of the world. In writing, the student places his sheet of paper on a grooved surface and makes perforations with a stiletto, working from right to left. When the sheet is turned over, as one turns the page of a book, the fingers move from left to right along the

line of these perforations, and their position indicates the words just as letters do for us. But these schools aim not only to give literary training, but especially to overcome such physical weakness as is most common among the blind, and also to teach such occupations, of one sort and another, as may safely be depended upon for a livelihood.

In more recent years some of the larger public libraries have begun to include collections of books for the blind. In some of the states attempts are being made to direct the training in their own homes of those who have lost their sight after reaching maturity. Typewriters which do the work commonly required of such machines, and at the same time make for the blind operator a duplicate written according to the point system, have been perfected. These materially widen the field of employment for the blind, which even now remains sadly restricted. For years the pianos in the city schools of Boston have been tuned by students of the Perkins Institution; in many states the blind have found such work agreeable and reasonably profitable. Instruction in various trades is given in all schools for the blind, for, whether the students do, or do not, ultimately use these as the means to a livelihood, they serve both to develop the all-important sense of touch, and to stimulate the mind to new activities. See HOWE, SAMUEL GRIDLEY; KELLER, HELEN ADAMS; MANUAL TRAINING.

Blindworm. See GLASS SNAKE, subhead *Blindworm.*

Bliss, Philip Paul (1838-1876), an American singer and evangelist, born in Clearfield, Pa. Mr. Bliss traveled throughout the United States and Canada with Dwight L. Moody, holding evangelistic meetings. The result of their combined efforts was a great religious awakening throughout the country, due largely to the exceedingly masterful rendering of gospel hymns by Mr. Bliss, many of them of his own composing, such as *Hold the Fort, Pull for the Shore, Hallelujah, 'Tis Done!* and many others of national fame. He died, singing for the encouragement of his fellow victims, amid the flames of the terrible railroad wreck at Ashtabula, Ohio, in 1876.

Blister Beetle, a peculiar beetle of the Meloid Family, so named from the power of its dry, powdered body to raise blisters upon the human skin. In this form it is sold by druggists as cantharides. The beetle is long, with slender legs, broad head and fleshy body of various metallic colors. It is frequently seen crawling over meadow flowers such as daisies, buttercups, goldenrod, etc., where it feeds upon harmful insects that would otherwise trouble man. The blister beetle goes through a long course of development. One species, in its larva form, cleverly attaches itself to the body of bees, and is carried to the hive, where it slyly slips into the honey cell in which an egg is deposited, and there floats about on the egg as a raft and feeds upon the contents of its boat. By the time the egg is eaten the larva is large enough and strong enough to escape death from drowning in the honey, and then can secure its own freedom. Blister beetles should be recognized and respected in the field, where their aid to the farmer is sufficient to render them worthy of protection.

Bliz'zard, a severe storm characterized by a high wind, low temperature and fine dry snow or spicules of ice. The most severe blizzards occur in the northern part of the Mississippi basin, particularly in the Dakotas and Minnesota, but they may extend as far south as the Ohio River. A blizzard usually is preceded by a short period of pleasant, warm weather, which it follows without forewarning. Blizzards are caused by the outward and downward rush of cold air, brought on by local atmospheric disturbance. Storms arising from the same causes and marked by a heavy downfall of snow and freezing wind occur in the region of the Adriatic, where they are called *bora.* Similar disturbances are the *mistral* of France, the *buran* of Russia and the *pampero* of South America.

Blockade', the act by which a port is

closed to the passage of vessels. This is a warlike act by which a power seeks to weaken its enemy by cutting off his neutral trade. Three things are necessary to make valid the capture of a vessel for running a blockade: first, notice of blockade must have been given, either by announcement to neutral powers or by warning at a blockaded port; second, the blockade must have been effective, that is, according to the Declaration of Paris, "maintained by a force sufficient really to prevent access to the coast of an enemy;" third, an attempt to break a blockade must actually have been made. See NAVY.

Block'house", a military fortification, usually made of logs banked with earth and protected by a surrounding stockade. The form of construction and the material used depend largely upon the purpose for which they are built and the material at hand. They were used in the Civil War of the United States to protect Sherman's line of communication in his campaign about Atlanta. The Spaniards used them in the Cuban War, and in the Boer War the British had a long line of them connected partly by wire barriers. The blockhouses constructed during the early history of our country were usually square, and raised 10 or 12 ft. from the ground upon a square support, a little smaller than the house. Both the house and the support were made of hewn logs, which fitted closely together. Small holes, called portholes, were cut through the walls at intervals, through which the inmates fired upon the attacking party.

Block Island, R. I., an island in the Atlantic Ocean 10 m. from the mainland of Rhode Island, to which state it belongs, midway between Montauk Point, L. I., and Point Judith, R. I., and constituting the Township of New Shoreham in Newport County. The island is eight miles long and from two to four miles wide. There are two harbors, one on the east side artificially constructed by a great breakwater, and another reached from the west side of the island by a channel cut from the ocean into the Great Salt Pond. Between these harbors lies the town that contains most of the dwellings and the numerous big hotels. Block Island is a popular summer resort. It has steamer connection with Newport, and during the summer directly with New York City and Long Island Sound ports. There is an excellent bathing beach. There are lighthouses on the northern and southern extremities, one of them being the great South Light. A hardy race of mariners inhabits the island. The summer business is preeminent, although the fisheries are of great importance.

The island was named by Adriæn Block, who visited it in 1614. The first settlement was made in 1662, and it was captured by French privateers in 1689. A ship bearing emigrants from the Palatinate was wrecked here in 1720 and this gave rise to Whittier's poetic legend of *The Palatine*. Population in 1910, 1314; the population is augmented in summer by thousands of visitors.

Block Signals, signals now generally used by the best railroads to indicate whether tracks are occupied or clear, thus protecting the lives of both train crews and passengers. Each track is divided into a series of blocks, or sections. On suburban lines, these blocks are short, perhaps only a few hundred yards long; but, where the train service is less frequent, they may be, and often are, some miles in length. The essential feature of the block system is this: that only one train at a time shall be allowed in any given block, for thus only can the danger of collisions be absolutely eliminated. In December, 1839, the Great Western Railway of England began using the block system. In the United States this was first taken up by the Pennsylvania Railroad in 1876. Because automatic devices permit of no mistakes, while the most competent employees always make some, the tendency is toward the adoption of automatic systems, in which electric connections operate semaphore signals, or lights—commonly red for danger and green for safety. Block signaling is now univer-

sal in England, though not everywhere automatic. In the United States the demand for safety in railroad travel is forcing its rapid extension. See SEMAPHORE.

Blood, in human physiology, the liquid substance which circulates through the arteries and veins of the human body, nourishing the tissues and maintaining life. Arterial blood, which has absorbed oxygen in its passage through the lungs, is bright red; but it becomes darker with carbon dioxide absorbed during its circuit of the body. The blood is nourished by the food in the alimentary tract and renewed by oxygen in the lungs. It acts as a sewage system, draining off the waste material and conveying it from the tissues to the excretory organs. The only parts of the body not supplied with blood are the hair, the hard part of the teeth, the outer layer of the skin, the nails and the cartilages. The best authorities estimate the quantity of blood at about one-thirteenth the weight of the body; a person weighing 150 lb. would, therefore, have a little over 11½ lb. of blood. About one-fourth of this would be in the heart and larger blood vessels.

The blood is made up of a colorless, watery-looking substance, called plasma, and countless solid bodies, known as corpuscles. The corpuscles are of two kinds, the red and the colorless. The function of the colorless corpuscles seems to be to devour the bacteria, or disease germs, which attack the body through the blood. Sometimes the disease germs are present in larger numbers than the corpuscles, and it is the latter that are destroyed. The red are more numerous than the colorless corpuscles. They give the blood its color. It has been estimated that there are approximately 5,000,000 of them in a drop of blood the size of a pinhead. They are in the shape of disks, with a slight depression on each face. They are constantly wearing out and being destroyed and cast out of the system, and are as constantly replaced by new ones developed in the red marrow of the bones. Each is soft like jelly and is composed of water and a proteid substance containing iron, called hæmoglobin, which has the property of combining with oxygen, wherever there is an abundance of that gas, and of throwing it off in regions where it is absent. See CIRCULATION; HEART.

Blood'hound", a breed of large and powerful dogs belonging to the class of hounds and particularly noted for their keen scent. They have massive heads; long, silky ears which, in the standard American breed, must be long enough to overlap when drawn across the eyes; large, solemn eyes, hazel in color and having a third lid called a "haw." Their faces are wrinkled, and the deep, square muzzle gives them an appearance of peaceful dignity which is added to by the broad chest and powerful shoulders. The neck is of such length as to allow the head to droop so that the animal can follow the scent while running. In color bloodhounds are black with more or less tan; the coat, except on head and ears, is of short, hard hair.

On account of the keenness of their scent, which is, in part, an acquired trait, bloodhounds have long been used in tracing fugitives; they seek out the trail slowly and carefully, but once having found it are able to follow it with unerring instinct whether along much-traveled pavement or through thickest wood. Running water alone seems to baffle their keenness and break the trail. When at last their prey is brought to bay, they content themselves with guarding it, and announce its capture by prolonged baying; they never, as some suppose, pounce upon their captive, except in self-defense or to prevent its escape. The name bloodhound refers not to its disposition, which is ordinarily docile, but to the purity of the breed; the name was first, blooded hound.

Blood Money, money paid by an assassin to the nearest relative of the victim. By the payment the slayer secured freedom from vengeance for himself and his kin. This practice was once common among the Teutonic and Anglo-Saxon races, where the price paid was called the wergild. The value differed with the

rank of the person slain: £24 for a freeman, £4 for a feudal tenant and 40 pence for a serf. The payment of blood money is occasionally made yet in Arabia.

Blood'root", a delicate plant of the Poppy Family, named from its blood-red juice. As it pushes up through the ground, the solitary five-lobed leaf, which springs directly from the root, forms a protecting cap over the single blossom. The flower stem soon outdistances that of the leaf in growth, and the two sepals, or outer coverings, fall as the flower opens. The eight or ten white petals spread almost flat in the sunshine, disclosing the numerous golden stamens. The petals close at night and the flower is not long-lived. After the flower falls, the leaf stem grows rapidly and the leaf expands until it is from six to ten inches broad. The roots, which also contain the red juice, extend horizontally near the surface of the ground and are somewhat thickened. The juice was used by the Indians as a dye and is still used for medicinal purposes. Bloodroot is found throughout the woods of Canada and the United States, and blossoms in April and May.

BLOODROOT

Blood'stone", or **He'liotrope**, a green variety of chalcedony, containing spots of red jasper. Deposits occur in nearly every country, but the most valuable stones come from Asia. Bloodstone is used for seals, signet rings and for other such purposes. The ancients valued it as a gem and for its supposed magical properties. See CHALCEDONY.

Bloom'field", N. J., a city of Essex Co., 4 m. from Newark and 10 m. n.w. of New York City, on the Erie and the Delaware, Lackawanna & Western railroads. The German Theological Seminary of Newark is located here. Bloomfield once ranked as an educational center. It was founded in 1685 under the name of Watsessing, but received its present name from Gen. Joseph Bloomfield in 1796. The city has extensive manufactories of church and cabinet organs, tissue and photographic paper, electric elevators, hardware, brake shoes, silk, woolen and brass goods, pins and needles. Population in 1920, 22,019.

Bloom'ington, Ill., a city and county seat of McLean Co., 45 m. s.e. of Peoria and 125 m. s.w. of Chicago, on the Illinois Central, the Chicago & Alton, the Lake Erie & Western, the Cleveland, Chicago, Cincinnati & St. Louis and other railroads. There is an excellent street-car service. The Illinois Traction System, an interurban line, reaches Peoria, Decatur, Springfield and St. Louis direct and many other towns and cities. The city owns its own water and light plant. The city is situated in the Illinois corn belt and is surrounded by a fertile agricultural region and mammoth coal fields. The largest nursery in the state, comprising over 1000 acres, is located here.

PARKS AND BOULEVARDS. Bloomington contains many cluster-lighted streets, and the balance are well paved and lighted and shaded by handsome trees. There are many beautiful residences. Miller, Franklin and O'Neill Lake are the largest of the city parks, Miller Park being especially noted for its beauty.

PUBLIC BUILDINGS. The principal public buildings include the courthouse built of marble, Y. M. C. A. Building, Masonic Temple, Coliseum, post office, banks, opera houses, Bloomington Club

Building and substantial business blocks. There are about 35 churches. The Alton Railroad is building a $100,000 station.

Institutions. The educational institutions include the Illinois Wesleyan University (Methodist), German Lutheran Schools, a high school, St. Mary's and St. Patrick's schools and Withers Public Library. There is an excellent system of public schools. The Edwards, the Emerson and the Irving buildings exemplify the best modern school buildings and equipment. Manual training and domestic science and art are taught in the ward schools. The Bloomington High School is one of the few city high schools in the state that has agriculture as a part of the regular work. Among the benevolent and charitable institutions are a state soldiers' orphans' home and a number of hospitals.

Industries. Chief among the industrial establishments of the city are the shops of the Chicago & Alton Railroad. Other establishments include a candy factory, canning works, proprietary-medicine factories, flour mills, brick and tile works, a stove factory, a brass foundry, heavy forging works and manufactories of automatic scales, vacuum cleaners, awnings, wagons and carriages, blank books, jar seals, wood novelties, brooms, furniture, dental supplies, portable elevators and agricultural implements. There are also slaughtering and meat-packing establishments and extensive coal-mining interests. The city is recognized as an important market for high-grade live stock and is a shipping point for horses for the Eastern and Western markets. In the last few years Bloomington has been selected by large agricultural implement firms as a distributing point, and a number of buildings have been erected for this purpose.

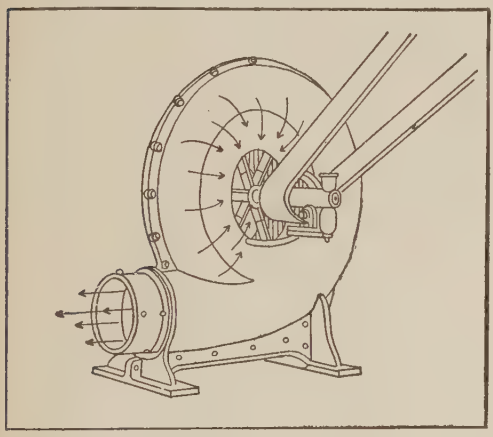
History. The first settlement was made in 1822 by pioneers from Kentucky and New England. It became the county seat in 1831 and was granted a city charter in 1850. The city has been the residence of a number of prominent men, including David Davis, an associate justice of the Supreme Court, and friend of Lincoln, Adlai E. Stevenson, vice-president of the United States, 1893-97, Gov. Joseph W. Fifer, Gov. John M. Hamilton and Gen. Asharel Gridley. Population in 1920, U. S. Census, 28,795.

Bloomington, Ind., a city and county seat of Monroe Co., 60 m. s.w. of Indianapolis, on the Chicago, Indianapolis & Louisville and other railroads. It is situated in an agricultural and limestone region, and the city has vast quarrying interests. There are also important manufactories of gloves, baskets, plate glass and furniture. The Indiana State University, established in 1828, and the Monroe County Library are located here. The town was settled in 1818 and incorporated as a city in 1876. Population in 1920, U. S. Census, 11,595.

Blouet, *Bloo" eh',* **Paul** (1848-1903), a French satirist, better known by his pen name, Max O'Rell. He was born in Brittany. In his youth he served in the French army; later he removed to England, where he was war correspondent of several French newspapers. From 1876 until 1884 he was French master at St. Paul's School in London. The great success of his first book, *John Bull and His Island,* which appeared in 1883, made him adopt literature as his profession, and several other books of a similar nature followed. The years between 1890 and 1900 were devoted chiefly to lecturing, both in the United Kingdom and in the United States. Among his works are *John Bull and His Daughters, Jonathan and His Continent, A Frenchman in America* and *English Pharisees and French Crocodiles.*

Blowgun, a tube through which missiles are blown by the breath. These tubes, usually made from rattan, are from seven to ten feet long and have a bore of about half or three-quarters of an inch. The missile is usually a poisoned arrow, wound at the feather end with some material to make it fit the bore of the blowpipe. The weapon here described is that in use by South American Indians. A somewhat similar gun is used by a tribe in Borneo.

Blowing Machine, a machine for creating and maintaining a strong current of air under pressure. The bellows is one of the most common and the simplest form of blowing machine (See BELLOWS). The piston machine is another simple form. It consists of two cylinders containing air-tight pistons, which by their movement force the air through a delivery pipe. The pistons move up and down alternately so as to produce a continuous current of air. The most common form of modern blowing machine is the rotary fan or fan blast, consisting of a rimless wheel, with disks attached to the outer end of its spokes. These



PRESSURE BLOWER

disks fit into a circular chamber, in which they revolve. The wheel is made to revolve rapidly and the motion sucks the air into the chamber through the opening at the center, and forces it out through the delivery tube. Air compressors are used as blowing machines in the sand blast and for operating pneumatic tools. Large and complicated machines are often constructed to create the blast for smelting furnaces, but they operate on the same principles as the machines described above. See AIR COMPRESSOR; FAN.

Blow'pipe", a tapering, bent pipe for blowing air, employed to direct and intensify the flame of a lamp, candle or gas jet, used principally in chemical operations, and also by jewelers in soldering.

Blücher, *fon Blu'ker,* **Gebhard Leberecht von** (1742-1819), a field marshal of Prussia. He entered the army and attained the rank of captain. In 1772 he left the service in disgust because his colonel, on account of Blücher's dissipation, promoted a younger officer above him, and engaged in farming for the next 15 years, but returned to the army in 1787. When the Prussians arose against the French he was given the chief command in Silesia. He had a large share in the defeat of the French at the Battle of Leipsic in 1813. In March, 1813, he entered Paris in triumph. On Napoleon's return from Elba Blücher was placed in general command of the Prussian troops and saved the day for Wellington at the Battle of Waterloo by his timely arrival (See WATERLOO, BATTLE OF). He marched again against Paris and was held in check by the Duke of Wellington from despoiling the city. Frederick William III created a new order in his honor, of which the badge was an iron crown surrounded by golden rays. Blücher was rough and uncultivated, but very frank and loyal and a true patriot. Among the many statues his grateful countrymen have reared in his honor, the one at Breslau is the best and is considered Rauch's masterpiece.

Blue, Archibald (1840-), a Canadian journalist and statistician, born in Ontario. Having taught school, he was successively on the staff of the St. Thomas *Journal,* the Toronto *Globe* and the Toronto *World.* He organized and was secretary of the Ontario Bureau of Industries, was deputy minister of agriculture in that province, there organized and headed the Ontario Bureau of Mines and, 1905, became head of the Canadian Census and Statistics Department. Besides several brochures on vital subjects, he has prepared the various publications of the bureaus of industries and mines and several census and year books.

Blue'beard", the hero of a familiar tale, which, in the 18th century, was introduced into English from the French

of Perrault. In the story, Bluebeard has destroyed six wives, and to the seventh, on a certain occasion, intrusts his castle keys, with orders to keep out of a special room. Disobeying, she discovers the remains of her predecessors, whereupon Bluebeard, enraged, is prevented from slaying her by the arrival of her brothers, who kill him. With variations, the story occurs in the folk lore of different peoples. The original may have been a Gilles de Laval of the 15th century.

Blue'bird", a bird of the Thrush Family. It is a little smaller than the robin (seven inches) and is easily recognized by its dark blue back, reddish-brown breast and whitish under parts. As early as Washington's birthday, this beautiful bird arrives from its Southern winter home. It quickly becomes accustomed to the presence of man and frequently builds its nest near his habitation. Were it not for the presence of the English sparrow, this bird would be much more common in towns and cities. As a valuable destroyer of injurious insects, its presence should be encouraged about orchards and farms. The grass-lined nest is built in holes in posts, rails, trees and buildings and contains four to seven greenish-blue eggs. Two broods are reared during the season, and the young leave the nest when about 15 days old. The bluebird ranges throughout the United States and southeastern Canada, east of the Rocky Mountains, wintering from the 40th parallel to Cuba.

Blue Crane. See HERON, subhead *Great Blue Heron.*

Blue'field", W. Va., a city of Mercer Co., 106 m. w. of Roanoke (Va.), on the Norfolk & Western and other railroads. The city is situated in a country well adapted to agricultural and grazing purposes and has a wealth of blue grass lands. Bluefield is in the midst of one of the richest coal regions in the country. The great Flat Top mountain range, from which this coal is obtained, is part of the dividing line between West Virginia and Virginia. The coal mined here has also high value for coking purposes. Iron-ore deposits and a variety of minerals are found here. Stock raising is an important industry. Bluefield contains large railroad shops and flour and planing mills. A normal school for negroes is maintained here by the state. The first settlement was made in 1888 and the town incorporated in 1893, since which time there has been a rapid growth. Population in 1920, 15,282.

Blue'fish", a widely distributed family of ocean fish, found in the Atlantic and Indian oceans and the Mediterranean Sea. Members of this family are not generally found where the water is below 40° F., but they are wandering in their habits and are apt to be found wherever the temperature is suitable. Bluefish are of trim shape, have solid, somewhat thickened bodies and few fins; as their name implies their prevailing color is blue. They are excellent game fishes, being active and tenacious and having sweet, fine-flavored flesh. Their average weight is five or six pounds, but much larger bluefish have been caught. They are among the most commonly offered fish of Eastern markets.

Blue Flag. See IRIS.

Blue Grass, or **Meadow Grass,** a favorite pasture and lawn grass and a member of the Grass Family. It is of a dark green color and has an especially long season of growth, which, with its abundance, accounts for its desirability. It spreads by means of a running root-stock, and the flowers are more crowded and of a more purplish cast than those of other grasses. It grows abundantly on soil of limestone formation and hence is plentiful throughout Kentucky and Tennessee, the Blue Grass Region. Kentucky itself is called the Blue Grass State, and the character of the pasturage is supposed to be in part responsible for the high-grade stock produced there. Blue grass flowers in April in the South, in May in the West and in June in the North.

Blue Island, Ill., a city of Cook Co., 2½ m. s. of the city limits of Chicago, on the Calumet River and on the Chicago, Rock Island & Pacific, the Grand Trunk, the Michigan Central, the Chi-

cago & Calumet Terminal and other railroads. The town is an important suburb of Chicago and is a railroad, commercial and manufacturing center. It contains brickyards, stone quarries, wireworks, oil works and smelters. Blue Island was settled in 1833 and incorporated as a village in 1872. Population in 1920, U. S. Census, 11,424.

Blue Jay. See JAY.

Blue Laws, the name applied to any legal restrictions involving domestic rights and freedom of action of any person. The phrase had its origin in the New England Colonies, where the early laws were of more stringent character, but not until the New Haven Colony in Connecticut printed certain regulations and had them bound in a blue-paper cover was the term *blue laws* applied. The famous "Connecticut Blue Laws," however, had their origin in writings of Rev. Samuel A. Peters, a Tory minister in charge of English churches in Hartford and Hebron. Compelled by the Revolution to flee to England, he published there in 1781 a work purporting to be a general history of Connecticut. The exaggeration and satire of this work make it a curiosity. Many years ago a small book containing these supposed laws, which were really extracts from the history of Peters, was published, and even now is referred to as authority by the unsuspicious. Among these so-called laws were the following:

No one shall be a freeman or have a vote unless he is converted and a member of one of the churches allowed in the dominion.

No one shall cross a river on the Sabbath but authorized clergymen.

No one shall eat mince pies, dance, play cards, or play any instrument of music except the drum, trumpet or jews-harp.

No food or lodging shall be offered to a heretic.

No gospel minister shall join people in marriage. The magistrate may join them, as he may do it with less scandal to Christ's church.

Blue Mountains, a name applied to many mountain ranges. The Blue Mountains of Oregon are a long range in the northeastern part of the state and are great granite peaks covered with forests of fir and pine. The Blue Mountains of Jamaica cover the eastern one-third of the island. Blue Mountain Peak, the highest of the range, is over 7000 ft. in height. These mountains are remarkable for their dense vegetation and their beautiful scenery. A smaller range of Blue Mountains is a low chain extending across New South Wales, Australia.

The Blue Mountains of eastern United States are more frequently called the Kittatinny Mountains. They are a part of the Appalachian system and extend across Pennsylvania, New Jersey, Maryland and Virginia. The highest peaks are less than 3000 ft. in height, but the scenery throughout is picturesque. The Blue Mountains are separated from the Blue Ridge by the Great Valley.

Blue Nile. See NILE.

Blue Peter, a blue flag having a white square in the center. The hoisting of the flag indicates the sailing of a vessel or its recall. The name is a corruption of blue repeater, the name of an English sailing signal.

Blue Print, a specific name for a positive photograph having white lines on a blue ground, obtained by exposing a drawing on transparent cloth, under which rests a blank sheet of paper previously sensitized by potassium ferricyanide and citric acid. Either the sun or electric lights can be employed to make the reproduction of drawings.

Blue Racer. See BLACK SNAKE.

Blue Ridge, a mountain chain of eastern United States, forming the southeastern ridge of the Appalachian system. It extends in a northeasterly and southwesterly direction through Pennsylvania, Maryland, Virginia and North Carolina. In the two first-named states the ridge is more frequently called South Mountain. Valuable forests of oak, maple, chestnut and ash are found upon the slopes of the Blue Ridge almost throughout its whole extent. The highest portion of the ridge lies in Virginia and is

known as the Peaks of Otter. The Blue Mountains, often confused with the Blue Ridge, comprise the next range west, and are separated from it by the Great Valley.

Blue Vitriol, *Vit' ri ul.* See COPPER SULPHATE.

Blun'derbuss, an obsolete gun or musket. This was a large smooth-bore gun, flaring at the muzzle, for shooting several balls and slugs, or shot. It was very effective at short range, but useless for reliable execution beyond that. Many English and German troopers were armed with the blunderbuss in the 17th century, but it has been long out of use.

Bo'a Constric'tor, a serpent of the Boa Family found only in tropical South America. Like all boas it kills its prey by squeezing it in the folds of its heavy body. The largest specimens seldom exceed 11 ft. in length. In color this boa is a beautiful rusty brown, with tan-colored saddles. In captivity it is docile and is the serpent often made use of by snake charmers. See ANACONDA.

Boadicea, *Bo"a di se' a,* (-62), a warrior queen of an eastern Briton tribe. Having been outraged by the Romans after the death of her husband, she gathered a large army of Britons, with which she attacked Roman settlements, burned London and destroyed about 70,000 Romans, many of them by torture. Finally Suetonius, Roman governor of Britain, advanced with 10,000 men against Boadicea, who had 263,000 followers, and defeated her. In her despair she committed suicide.

Boar, the wild member of the Swine Family and probably the original of many domestic breeds. It is native in central Europe, northern Africa and southwestern Asia. Its head is long and pointed, terminating in a tough, movable snout which is strong enough to plow up the ground in its search for roots and buried nuts. Its upper canine teeth curve sharply upward soon after protruding from the jaw, and the lower ones, also extending upward, are kept in a knife-like sharpness by grinding against them. The wild boar is a ferocious animal, not hesitating to charge upon its enemy with great fury. Boar hunting was once a favorite and very exciting English sport, carried on by means of dogs and by hunters, following on foot, armed with spears or knives.

Board of Trade, an association which seeks by united action to facilitate trade and to secure for its members advantages which they could not obtain as individuals. The first of such associations was formed at Marseilles, France. The Paris Chamber of Commerce was established in 1700, and the oldest in Great Britain opened at Glasgow in 1783. Other important English associations are those of Manchester, Hull and Leeds; while the Liverpool Exchange maintains close connections with American markets, and in importance is second only to the Royal Exchange, or London Chamber of Commerce, the center of European commercial activity. The New York Chamber of Commerce, established in 1768, ranks first in the United States.

Boatbill, a bird resembling a night heron and about 18 inches in length. The

BOATBILL

plumage is lavender-gray and grayish-white, except the breast and abdomen, which are cinnamon or brownish-red in color. The crown of the head and the long crest are blue-black, and there are white patches on the forehead, throat, chest and sides of the face. The bird re-

ceives its name from its wide, thick bill, which has a yellow pouch beneath the lower mandible. The legs and toes are quite long. The nest and eggs have not been described. The boatbills range throughout the northern part of South America, where they wander in small flocks. They are thought to be nocturnal in habit.

Boat'swain. See TROPIC BIRD.

Boatswain, *Boat' swain* or *Bos' n,* a naval officer of warrant rank. He has charge, under the commissioned officer, of the rigging, etc., of a vessel, summons the crew by means of the *boatswain's call* or *whistle,* and acts as general assistant to his superior officer. After six years of service he may be promoted, if he passes his examinations, to the rank of ensign, among the commissioned officers. See NAVY; ENSIGN.

Bob'cat. See LYNX.

Bob-o-Lincoln. See BOB' OLINK.

Bob'olink, a bird of the Blackbird Family. These birds appear in the Northern States and Canada about the first of May and remain until late in August. When they appear the male is easily recognized by its coloring, as well as by its song. The bobolink is a little

BOBOLINK

larger than an English sparrow. During the mating season the male is characterized by its black body, neck and head and ashy-white shoulders. The rump and upper tail feathers are white. The female is yellowish-brown above, paler and light buff below and has a light stripe on the crown. All through the nesting season the males are bold and very conspicuous. Perched on fences, trees, stalks of weeds or blades of grass, they pour forth their spirited song, the distinguishing notes of which are "bob-o'-link, bob-o'-link." This habit of the bird is vividly characterized by Bryant in the opening stanza of his *Robert of Lincoln:*

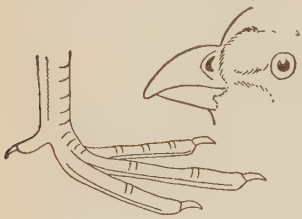
Merrily swinging on brier and weed,
Near to the nest of his little dame,
Over the mountain-side or mead,
Robert of Lincoln is telling his name:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Snug and safe is that nest of ours,
Hidden among the summer flowers.
Chee, chee, chee.

The nest is built in a little hollow in the ground in a secluded place among the tall grass or reeds, and is made of dry grass. It contains from four to six greenish-white eggs, spotted with lilac and brown. While the female is sitting upon the eggs, the male remains perched near by in such a position as will enable him to warn his mate of the approach of danger. From this conspicuous position he pours forth his song the livelong day. When the young appear, however, the song becomes less frequent, and finally ceases altogether. The male now changes his bright plumage for a coat resembling that of the female, and in August the birds begin to gather in fields in large flocks, feeding upon seeds and grain. They are especially fond of the seeds of dock and dandelion.

Late in August these birds appear along the river banks in Pennsylvania and southern Ohio, where they are known as the reedbird. Here they feed upon wild rice and become fat, and are shot by the hundreds for near-by markets. Later they appear in the rice fields of the South, where they are known as the ricebird or rice bunting. They attack the rice fields in such numbers that they are said to destroy $2,000,000 worth of this grain annually.

Bob'white", a bird of the Quail Family. The quail, or bobwhite, is about the

size of the robin. The feathers of the upper parts are reddish-brown, with black bars; the rump is grayish, streaked with black; the tail is gray; there is a black band on the breast; the throat and under parts are white; and the forehead is black. The nest is made on the ground usually in open fields, and is composed of grass, leaves, straw, etc., and contains from 10 to 18 white eggs. The breeding season begins in May and two or three broods may be raised. Both parents assist in incubating the eggs, which requires about 24 days. After the breeding season is over, the quail assemble in flocks, or covies. During the shooting season, they are persistently hunted and are considered among the best of the game birds. Quail are valuable destroyers of noxious insects, particularly the chinch bug and the potato beetle, for which reason the farmer should rigidly protect them. The name is derived from the clear ringing whistle, which sounds like the syllables "bob white."



HEAD AND FOOT OF BOBWHITE

Boccaccio, *Bok kah' cho,* **Giovanni,** *Jo vahn' ni,* (1313-1375), an Italian novelist and poet. Both a commercial career and the law were distasteful to him, but it was not until after he had taken his doctor's degree in canon law in obedience to his father's wishes, that he was able to devote all his time to literature. In 1331 he fell in love with Princess Mary, daughter of King Robert of Anjou, and wrote verses in her honor. His meeting with Petrarch in 1350 influenced him to turn away from immoral pleasure to wholesome, virtuous thoughts and purer fame. *Decameron,* or *Ten Days' Entertainment,* is his greatest work. These hundred tales of love, written in the purest Italian prose, are a mixture of Southern elegance and grace and revolting coarseness and licentiousness. In 1373 he was offered the chair established by the Florentines for the exposition of the *Divina Commedia.* He also wrote *Il Filocopo,* his first work of fiction; *Il Filostrato* and *Il Teseide,* two poems interesting as forming the basis of Chaucer's *Knight's Tale* and *Troilus;* and numerous Latin poems and prose writings.

Bœhmeria, *Bu me' ri a,* or **Ramie,** *Ram' e,* herbs or shrubs of the Nettle Family, having an exceedingly strong and fine fiber. Unlike most of the nettles the bœhmerias are without prickly, stinging hairs and biting juice. The stems are smooth and woolly but bear large, coarse leaves, which have rough hairs and coarsely-waved margins. The flowers grow on slender, drooping stalks hanging from the leaf axils, and are of two kinds, the fertile, which are to bear seeds, and the sterile, which will be fruitless. The individual blossoms have rough, spreading petals and long, protruding stamens. The most important bœhmerias grow in tropical countries and are valuable for their fiber, which is not widely used in spite of its excellence, because of the difficulty and expense in raising the plant and preparing it for use. In general, the preparation consists in stripping off the outer skin in ribbons, washing it, removing the gum and then bleaching. The degumming process is the costly part. The fiber is fine and white and is used in the manufacture of lace curtains, handkerchiefs, fine tapestries, plush and carpets.

Bœotia, *Be o' shi a,* an ancient republic of Greece lying between Phocis on the n. and Attica on the s. The Bœotians were an uncultivated race that succeeded in establishing themselves in Greece about 1124 B. C. They formed a league of 14 cities with Thebes at their head, and were generally unfriendly to surrounding districts. The region once called Bœotia is at present known as Viotia, and with Attica forms a nome, or district, of the monarchy of Greece.

Boer, *Boor,* War. See SOUTH AFRICAN WAR.

Bogota, *Bo"go tah',* the capital of Colombia, situated at the foot of the mountains, La Guadeloupe and Montserrato. Cool mountain streams supply the city with water; the narrow streets are clean and well paved. Bogota has been called the "Athens of South America," because of the interest shown in education. In addition to the university and three endowed colleges, are a military school, a school of chemistry and mineralogy and a national academy. The public library contains about 50,000 volumes. Other features of interest are the mint, the natural history museum, a botanic garden and an observatory. Due to the location of the city, manufacture and commerce are not highly developed, but the fertile country yields abundant agricultural supplies. The city was founded in 1538. Population, about 125,000.

Bohe'mia is the western province of Czecho-Slovakia possessing in area 20,223 sq. m. It is bounded on the north by Saxony and Prussian Silesia; on the east by Prussia and Moravia; on the south by Austria; on the west by Bavaria.

Bohemia is roughly diamond-shaped, mountain ranges forming the sides of the figure. The interior is a bowl-like depression which was, in ancient times, the bed of an inland sea about the size of Lake Michigan. These mountain boundaries form excellent strategical frontiers and served in the past to protect the Czechs (a Slavic people) from being overwhelmed by advancing German people. The Moravian mountains separating Bohemia from Moravia are insignificant highlands with no well defined ridges.

The Bohemian Forest is the name of the mountain range forming the boundary between Bohemia and Germany. In this range there are only two passes through which invading tribes could easily advance. The tumbled masses of hills extend far back into Bohemia and the peaks are densely covered with forests of which the silver fir is the most common tree. In the elevated portions of the forests are numerous picturesque lakelets, near the summits of the higher peaks. They occupy crater-like depressions at the base of the peaks and are surrounded by pine-clad hills.

Three of the principal rivers of Germany,—the Elbe, the Vistula, and the Oder,—take their rise in Bohemia. The Elbe and its tributaries drain the central depression. The province is rich in minerals, such as iron, silver, tin, lead, copper, antimony, sulphur, alum, coal and precious and ornamental stones. Small quantities of gold are found in some river sands. Bohemia possesses the most famous mineral springs in Europe such as Carlsbad, Marianbad, and Franzbad. There are thirty-three mineral-spring health resorts in the province visited by many thousand patients every year.

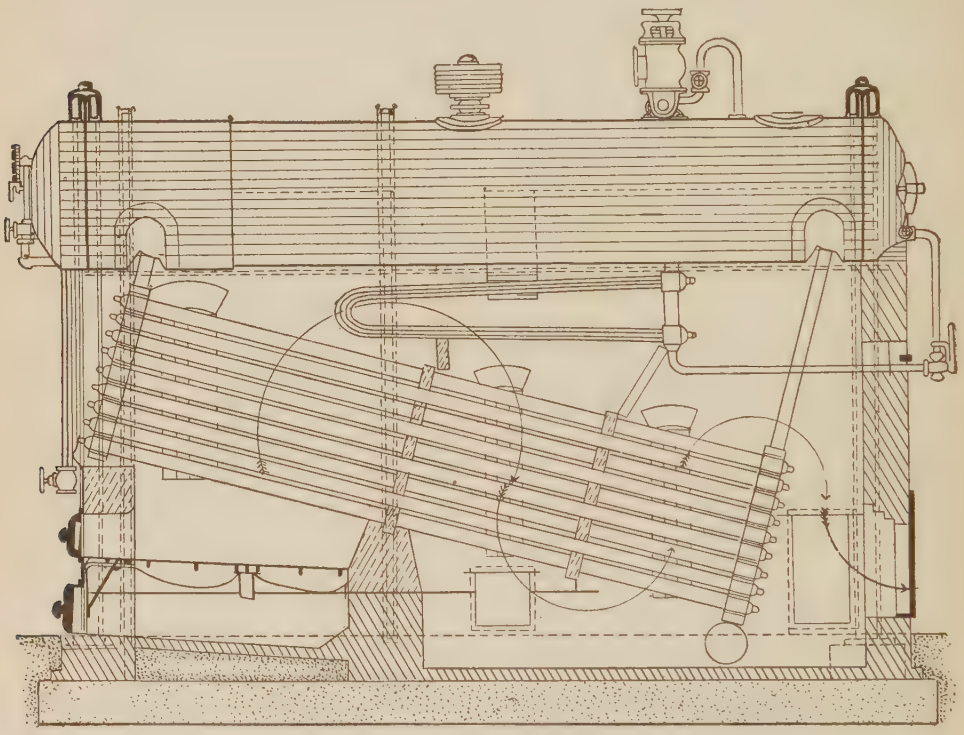
None of the surface is elevated above the limits of forest growth and most of the country is highly productive. Large vineyards are found in places. Fruits are abundant, chiefly apples, pears, plums, and other stone fruit. The chief agricultural products are wheat, rye, barley, oats, potatoes, flax, and hops. Within recent times Bohemia has been rapidly changing to an industrial state, utilizing its mineral wealth and splendid water power. Some of her products are of world wide fame, such as decorated and engraved glassware, high class cotton textiles, and linen goods. Population about 7,000,000.

History and People. See Czecho-Slovakia.

Boileau-Despréaux, *Bwah" lo'-Da"-pra"o',* **Nicholas** (1636-1711), a French poet and critic, born in Paris. In 1674 appeared the first of his four books on *The Art of Poetry.* In this series he analyzes poetry of different types and lays down rules for the language of verse. Its influence on French and English literature was wide. He also wrote *Le Lutrin, Discourse au Roi, Sur les Femmes, Sur la Prise de Namur* and *Sur l'Homme.*

Boil'er, a metallic vessel used for boiling liquids, employed in cookery and in the laundering of clothes. When used in heating water for making steam for

heating and power purposes, it is known as a steam boiler. Of these there are two kinds, stationary and portable, the former requiring a furnace with its necessary fixtures, and the latter having the furnace built in as part of the boiler. Steam boilers are of three patterns, known respectively as flue, tubular and water-tube boilers. In the flue and tubular boilers the heat passes through the flues, or tubes, which are surrounded by water. In the water-tube boiler the heat passes around the tubes which contain the water.



WATER-TUBE BOILER

Flues, being larger than tubes, are generally riveted at the ends to flanges or nozzles in the heads, and tubes are expanded directly into them. The cylindrical shell, with its two heads and flues, or tubes, comprises the boiler proper, which may be set on end over a furnace or placed horizontally within one. In the latter case the heat is applied first, under the shell of the boiler, and afterwards is drawn through the tubes by the draft of the chimney. Boilers of this form are surmounted with a dome, or steam drum, to furnish dry steam, and are supported by four lugs riveted to the shell, which sets and rests upon the side walls of the furnace. Support is furthermore given by the cast-iron front, carrying fire doors, furnace linings and ash-pit doors. Grate bars rest their front ends on the front, and their back ends are supported by a bearing bar on the bridge wall of the furnace. At the front end a breeching is provided to convey the smoke into the chimney.

Boiler fittings consist of a safety valve, which is arranged to blow off when the steam reaches a certain pressure; water gauges and gauge cocks, to indicate the water level in the boiler; and a steam gauge to show the pressure of the steam. A pump is required to supply water, a globe valve to regulate its flow, a check valve to assist the pump and a blow-off

valve to empty the boiler of water when required and for cleaning the boiler of sediment. Boilers used on boats and steamships are called marine, and their special construction is regulated by the United States Government. A boiler evaporating 30 lb. of water per hour when the temperature of the feed water is 100° F. and the pressure of steam is 70 lb. per square inch, as read from the steam gauge, has 1-horsepower, one evaporating 60 lb. per hour has 2-horsepower, and so on, each horse power being indicated by the evaporation of 30 lb. of water per hour under the conditions given.

Boiling Point, the temperature at which a liquid changes to a vapor with ebullition, or the violent formation of bubbles. This point is different for different liquids and even varies for the same liquid under different pressures. Thus water at the sea level boils at 212° F. or 100° C. under certain atmospheric conditions, but on the top of mountains boils at a much lower temperature. Under an air pump when the air has been exhausted, it boils at 23° C., or 73.2° F. Other causes which affect the boiling point are: the introduction of solutions less volatile than the liquid boiled, as a solution of salt in water raises the boiling point; the removal of dissolved air from the liquid, which causes the boiling point to be higher; and the character of the vessel in which it boils, as water boils at lower temperature in metallic than in glass dishes. See VACUUM PAN.

Bois de Boulogne, *Bwah de Boo lone'.* See PARIS.

Boise, *Boy' zay,* **Idaho,** a city, county seat of Ada Co., and capital of the state, 45 m. n.w. of Idaho City, on the north side of the Boise River and on the Oregon Short Line Railroad. The city has an elevation of 2760 ft. above sea level and the surrounding country is well adapted for agriculture, fruit growing and dairying. The Boise & Interurban line is one of the best-equipped electric lines in the country and runs the length of the Boise Valley from Boise to Caldwell, intersecting the Idaho Northern at Middleton. The Boise Valley electric line runs to Nampa about 20 m. distant. The city is the trading point for the mines of the Boise Basin, Atlanta and Rocky Bar, and Silver City.

PUBLIC BUILDINGS. The noteworthy public buildings include the capitol, costing $1,500,000, Federal Building, government assay office, a Carnegie library, fine office buildings, theaters, banks, hotels, including the new Owyhee, and Y. M. C. A. and Y. W. C. A. buildings. Boise contains numerous handsome residences and many churches, among the number being two cathedrals. The natatorium is supplied with hot water obtained direct from artesian wells. This water is also used for heating many public and private buildings. Boise Barracks, a three-company post, is located two miles from the city.

INSTITUTIONS. The educational institutions include St. Teresa's Academy, St. Margaret's Hall for young ladies, St. Joseph's School for boys and several business colleges. There is an excellent system of public schools, and a normal school is maintained here during the summer. A soldiers' home and the penitentiary are located near the limits of the city.

INDUSTRIES. Boise is the trade center for a large mining, fruit-growing and farming section, and it is also an important wool market. Lumber, flour and machine-shop products are extensively manufactured.

HISTORY. The first settlement was made in June, 1863. The city had a rapid growth after 1900 owing largely to the great irrigation projects of the Boise-Payette system. Boise has the commission form of government. Population in 1920, according to the U. S. census, 21,393.

Bokhara, *Bo kah' rah,* a Russian state of central Asia, bounded by Russian provinces on all sides except the south, where it joins Afghanistan. The western part consists largely of desert, with a few fertile oases and river courses. The central and eastern portions are mountainous. Corn, fruit, silk, tobacco,

cotton and hemp are among the important products, and goats, sheep, horses and camels are raised upon the mountains and plains. Gold, salt, sulphur and alum constitute the mineral products. Bokhara has been Russian since 1873, and since then no foreigner is admitted without a Russian passport. The capital is the city of Bokhara. The area of the province is 83,000 sq. m., and its population is 1,250,000.

Bolan, *Bo lahn',* **Pass,** a pass in the mountains of British Baluchistan, on the highway which leads from the Indus to Kandahar, via Shikarpur, Dadar and Quettah. It ascends on an average of 90 ft. to the mile and is everywhere bounded by elevations 500 ft. in height. The British Government is now constructing a military railroad through the pass to connect Sindh with Kandahar.

Boleyn, *Bool' in,* **Anne** (about 1507-1536), the second wife of Henry VIII, and mother of Queen Elizabeth. She was the daughter of Sir Thomas Boleyn and Lady Elizabeth Howard. Henry VIII married her secretly in January, 1533. In May, 1536, she was sent to the Tower on a charge of adultery and treason, and was executed.

Bolingbroke, *Bol' in brook,* **Henry St. John,** Viscount (1678-1751), an English statesman and orator. He entered Parliament for Woolton Bassett in 1701 as a Tory member, and soon gained distinction by his eloquence. In 1704 he became secretary of war, but was forced to retire three years later, when the Whigs came into power. In 1710 he was appointed secretary of state, and three years later concluded the Treaty of Utrecht. He estranged many by his secret plotting, and was scheming to aid in the return of the Stuarts when Queen Anne's sudden death spoiled his plans, and he fled to France. In 1724, however, he was allowed to return to England, but not to hold a seat among the lords. Settling near Uxbridge, he sought the companionship of Pope, Swift and other writers, but, finding his efforts to be admitted to political life unsuccessful, he returned to France, where he wrote a *Letter on the True Use of Retirement,* and his greatest work, *Letters on the Study of History.* He returned to England in 1742, where he died. Consult *Bolingbroke, a Historical Study,* by J. C. Collins.

Bol'ivar, Simon (1783-1830), a leader in the South American struggle for independence, was born in Caracas, Venezuela, of excellent Spanish ancestry. He studied law at Madrid, traveled extensively in Europe and the United States and returned to his native country in 1809, determined to free it from Spanish rule. The movement was later extended to the other dependencies of Spain in South America.

On July 5, 1811, Venezuela declared its independence and war with Spain was begun. For eight years the struggle alternated between success and failure. Five times Bolivar was compelled to flee from the country, and as many times he returned to reorganize the revolutionary forces. In 1819 Venezuela and New Granada were united into the Republic of Colombia and Bolivar was chosen president. But it was several years before independence was finally secured. In 1821 the constitution of the new republic was proclaimed, and Bolivar was reappointed president.

Bolivar then led his army to the assistance of the neighboring countries, drove the Spanish forces from Ecuador and in 1823 entered the capital of Peru in triumph. He was appointed dictator and retained this position for two years until the country had secured its independence. The provinces of upper Peru separated from the Government of Buenos Aires in 1825 and constituted a separate state, which they called Bolivia in honor of the liberator, who was declared perpetual dictator. The constitution which he drafted for them vested such autocratic powers in the chief executive as to cause fear throughout the new republics that Bolivar contemplated creating a great South American empire of which he should be perpetual dictator. This alarm introduced new discord into the already discordant situation and the

last four years of Bolivar's life were spent in factional strife.

It was Bolivar's hope to unite the South American republics into a strong federation and he devoted his life and enormous private fortune to this object. His methods were perhaps too arbitrary, but the persistence and patience with which he clung to the cause of independence through every danger and discouragement revealed an unusually high order of courage and devotion. He has been called the "Washington of South America." Statues have been erected to his memory in the capitals of the countries he liberated, as well as in Central Park, New York City.

Bolivia, *Bo liv' i a,* an inland country of South America, bounded on the n. and e. by Brazil, on the s. by Paraguay and Argentina and on the w. by Chile and Peru. It once also included the strip, now owned by Chile, which stretched from Peru to the Tropic of Capricorn and west to the Atlantic Ocean. Losing this section has made Bolivia a landlocked country, with the Andes as a great natural barrier at the west.

Physical Conditions. The western and southern parts of Bolivia are mountainous and contain many of the highest peaks of the Western world. Between two of the loftiest of the mountain ranges lies a vast plateau 500 m. long and 13,000 ft. above sea level; half of this is occupied by the great Lake Titicaca, with its Island of the Sun, upon which the sun god and goddess descended when they visited mankind. To the north and east the forested slopes covered with cinchona and rubber trees stretch away to the rich undulating plains and river valleys. The greater number of rivers flow into the Amazon basin; chief among these are the Beni and the Mamoré. The Pilcomayo and the Paraguay drain into the Rio de la Plata.

Climate and Productions. Because of its variations of altitude, Bolivia, though in the torrid zone, has great variety in its climate. The tops of the mountains are capped with perpetual snow; the plateaus have dry clear air, pleasant days and frosty nights; the valleys have but two seasons: the rainy season, which may be called summer and which extends from December to May; and the dry season, extending from May to December. The mountains of Bolivia seem to be almost literally mountains of silver, and hundreds of millions of dollars have been coined from the productions of the mines near Potosi, Oruro, Colquechaca and Huanchaca. Copper, zinc, gold, cobalt, tin and antimony are also among the valuable and abundant mineral productions. This vast mineral wealth has somewhat overshadowed the production of precious stones, opals, diamonds, emeralds and topazes, which would otherwise excite attention. It has also detracted from the interest in the fertile farming lands of the plain, which at present are cultivated by only the most primitive methods. The opening of the railways between Lima in Peru, Buenos Aires in Argentina and La Paz in Bolivia will, no doubt, aid in bringing about their development. With present methods the plains yield quantities of bananas, rubber, vanilla, copal, coca, cinchona, coffee, cotton, sugar, potatoes, corn, tobacco, cacao and sarsaparilla. It is estimated that there are in the Beni basin alone 50,000,000 rubber trees, each of which yields annually from three to seven pounds of rubber. Alpaca, wool and chinchilla and vicunia skins are also among the exports.

People, Government, History, Etc. The Bolivians are of mixed Indian and Spanish descent. They are, in the main, intelligent people, proud of the history of their country and interested in its advancement. Many schools, colleges and universities have been established. Spanish is the prevailing language and Roman Catholic the common religion.

Bolivia was founded in 1825 by Simon Bolivar when the South American colonies rebelled against Spanish rule. Its boundaries were then much greater than now. After many turbulent years, though with fewer revolutions than the South American countries are supposed to have, Bolivia is a peaceful country

under a free government. The government is administered by a president, two vice-presidents, a cabinet of six members and three secretaries of state. The legislative department consists of a Senate and a House of Deputies, and the judicial is similar to that of the United States. La Paz is the capital city. Population, about 3,000,000.

Bologna, *Bo lo' nyah,* a city of Italy, capital of the province of the same name, situated 83 m. n. of Florence, at the foot of the Apeninnes. The town still preserves its medieval aspects. Among the prominent buildings are some hundred churches, including the San Domenico, the San Pietro and the San Giovanni; the Palazzo Publico, the Palazzo del Podesta and other fine Renaissance palaces; the remarkable leaning towers of Degli Asinelli and Garisenda; the university, founded in 1088; and the Academy of Fine Arts. The Cathedral of San Petronio, designed as early as 1390, was originally conceived in splendor surpassing the famous Cathedral of Florence, but the early plans were never completed. Industrially, Bologna is known for the production of its sausage, macaroni, canned fruit, liquors, silk, glass, leather and machinery. Bologna was one of the free cities of the middle ages, but in 1545 it became a part of the temporal possessions of the Church. In 1849 it passed under Austrian control, but was reunited to Italy in 1860. Population about 162,000.

Bolom'eter, an electrical instrument designed to measure small quantities of radiant heat by means of the change in the electrical resistance of conductors. It consists of a Wheatstone's bridge, with two strips of blackened platinum foil inserted in the arms. If one of these strips be exposed to a heated body, while the other is screened, the change of resistance will cause a deflection of the galvanometer (See GALVANOMETER). Difference of temperature of 1/10,000 of a degree may be measured.

Bolshevism. The form of government assumed by the revolutionary movement in Russia when the provisional government of Kerensky was overthrown. In ethymology, the word bolshevism, has nothing to do with any particular form of government. It originated as a party name in 1903 when the Social Democrat Party in Russia split into two wings, the Bolshevists, or the majority; and the Menshevists, or the minority.

In process of time, however, a new meaning has attached itself to the word Bolshevism and it now connotes an extremely radical and revolutionary form of socialism; in fact, is no longer democratic socialism, but the autocratic rule of one class of people professing to adopt the principles of socialism. That class of people is the proletariat, or the men whose sole capital is their hands. Their argument is that this class is the sole producer of wealth, consequently all political power should be in their hands. Only such men and women should have the right to vote, hold office, or be considered as real members of the state. In 1919 followers of the movement caused serious disturbances in several cities in the United States and Canada. (See SOVIET.)

Bombay', the chief seaport of western India, situated on an island of the same name. The magnificent view from the sea suggests the famous Bay of Naples. Malabar, with handsome houses rising like a terrace to the top of a high ridge, is the most popular suburb. Among prominent buildings are the various public offices, Bombay University, the Parsee Towers of Silence, the Cathedral and the secretariat. The dockyards, situated in one of the largest and safest harbors of India, represent the chief cause for the city's commercial importance. Milling, dyeing, metal working, tanning and the manufacture of cotton are important industries. The population, due to the geographical position of the city, is varied, for Bombay is the great meeting place for traders and travelers throughout the Eastern world. From 1891 to 1901 the plague played great havoc in the city, causing the population to decline by six per cent and the trade by seven per cent. The census of 1901, therefore,

found Bombay yielding to Calcutta its rank as the largest city in India. Population in 1919, estimated at 977,822.

Bonaparte, *Bo' na pahrt,* the name of a family made famous by Napoleon I. Several distinct families in Italy bore the name Bonaparte during the Middle Ages. In the 16th century a member of a Bonaparte family of Florence, Francisco by name, went to Corsica, where his descendants were lawyers and magistrates.

Carlo Bonaparte, the father of Napoleon, married in 1767 a beautiful Corsican girl 14 years of age, named Letizia Ramolino. He was restless and ambitious and plotted with Paoli for the independence of the island. He died in 1785. The mother of Napoleon survived her son by 16 years. She was frugal and pious and never could become accustomed to the life of the court. After Waterloo she lived in Rome a life of mournful seclusion and died in 1836.

Eight children came from this union: Joseph; Napoleon; Lucien, Maria Anna, afterward called Elisa; Louis; Carlotta, afterward called Marie Pauline; Annunciata, afterward called Caroline; and Jerome.

Joseph Napoleon (1768-1844) was the eldest brother of Napoleon and was educated in France at the College of Autun, afterward, in 1785, studying law in Corsica. In 1793 he lived in Marseilles and married a merchant's daughter of that city. As his brother Napoleon rose to power, Joseph was employed in various diplomatic and military affairs. He was made King of Naples in 1806 and King of Spain in 1808. After the Battle of Waterloo he fled to the United States and lived near Philadelphia under the title of Count of Survilliers, until 1832, when he went to England. He also visited Italy, where he died.

Napoleon (See Napoleon I).

Lucien (1775-1840), the next younger brother of Napoleon. He went to Marseilles in 1793 and there married Christine Boyer, the daughter of an innkeeper. In 1798 he was a member of the Council of Five Hundred, living in Paris, and later, as president of the Council, he aided his brother Napoleon in overthrowing the Directory and in establishing himself. He held to the republican ideas of the Revolution, and when he opposed the tyranny of his brother he was sent as an ambassador to Spain. After Napoleon's rule was made hereditary, Lucien settled in Rome, where he became absorbed in literary and scientific studies. He came to the aid of his brother in the last struggle which ended at Waterloo, and then returned to his studies. He was made Prince of Canino by Pope Pius VII, and was the author of several works.

Louis (1778-1846), the second younger brother of Napoleon I and the father of Napoleon III. He went to Italy and Egypt with Napoleon, and married Hortense, the daughter of Josephine, in 1802. In 1806 Napoleon prevailed upon him to accept the crown of Holland, and he tried to rule for the welfare of the people. He disagreed with his brother and abdicated in 1810. From this time he lived chiefly in Rome and Florence.

Jerome (1784-1860), the youngest brother of Napoleon. He became a lieutenant of the navy and was driven to New York by a British cruiser. He married Elizabeth Patterson in spite of his brother's protest, and left her two years later at Napoleon's command. In 1807 he was made King of Westphalia and compelled to marry Catharine of Württemberg. After the Battle of Leipsic he fled to Paris. When his nephew, Louis Napoleon, became president of the French Republic in 1848, he was made marshal of France and president of the Senate.

Bonaparte, Charles Joseph (1851-), an American lawyer and politician, born in Baltimore, Md., the grandson of Jerome Bonaparte, King of Westphalia and brother of Napoleon. Having graduated from the Harvard Law School in 1874, he began practicing in Baltimore, and while gaining distinction in his profession, identified himself with such movements as civil service reform. From 1902 to 1904 he was a member of the United States Board of Indian Commis-

sioners, from July, 1905, to December, 1906, he was secretary of the navy, and from then until March, 1909, he was attorney-general in the Roosevelt cabinet.

Bond, an obligation, or contract, in writing, by which it is agreed to pay a sum of money, or to do or not to do some particular thing. The party giving the bond is the *obligor;* the party receiving it the *obligee.* A bond is void, if the obligor thereby binds himself to do something which is of itself wrong or forbidden by law, or if by it the obligor agrees to neglect the performance of a duty properly incumbent upon him. A person who cannot legally enter into a contract may become the obligee but not the obligor under a bond (See CONTRACT). Bonds may be issued by public corporations, such as school districts, cities or counties, but under the restrictions laid down by the constitution or laws of the state. State and national governments also issue bonds; but no public corporation secures such obligations by a mortgage. The bonds of private corporations are often secured by mortgages; and of these the first mortgage bonds are most desirable because their payment may be much more easily enforced. Having a definite period to run, and bearing a fixed rate of interest, many bonds have interest coupons attached. These are cut off as they fall due, and presented for payment, usually through some bank.

Bone, the hard material which constitutes the skeleton or framework of Mammals, Birds, Reptiles and Fishes. The purposes of bone are to support the soft parts of the body and give it shape, to protect the delicate organs and to supply a part of the mechanical arrangement which facilitates free movement. Bones may be classified according to their shape, as long bones, of which the arm and thigh bones are conspicuous examples; flat bones, such as the scapula, or shoulder bone; and short and irregular bones, as those of the wrist or spinal column. All bone consists of two chief parts, an outer, compact layer and a porous interior. The outer shell is covered with a firm membrane called the periosteum; the inner portion is permeated with blood vessels which circulate freely, supplying new material and carrying away refuse.

In the young of man and other Mammals the body framework consists of cartilage, which is transformed into bone by a process of ossification. The parts near the joints harden slowly, thus reducing the shock of falls. Children's bones, for this reason, are not so easily fractured as are those of older persons. In early youth bone contains about equal parts of mineral and animal matter; but with advancing age the proportion of animal matter decreases until in the period of old age the mineral matter is so greatly in excess that the bones lose their elasticity and become brittle and are easily broken. Anyone can illustrate the effect of withdrawing the mineral matter by soaking the bone of a chicken's leg in weak muriatic acid until the mineral matter, composed chiefly of phosphate and carbonate of lime, dissolves, leaving a pliable substance which can be bent like rubber. If bone is burnt until the animal matter is destroyed, the remaining portion will be hard and brittle and easily pulverized. See SKELETON.

Bone Black, or **Animal Charcoal,** a product obtained by heating bones in closed retorts until the gases are driven off. The residue is a charcoal, which is ground up into various sizes, as required for different purposes. Its most important uses are in refining of sugar, decolorizing liquids and in removing the chemical impurities from water.

Bone'set", or **Thoroughwort,** *Thur' o wurt",* a medicinal herb of the Composite Family and familiar in meadows and lowlands in the United States and Canada. It has a rough, cylindrical stem which grows from one to five feet high. The leaves are light green in color and are opposite on the stem, each pair having their bases so joined as to have the appearance of a single leaf pierced by the stem. The stiff flower stems extend from the axils of the leaves at a sharp angle and bear flat-top clusters of coarse,

though not large, white flowers. A hillside species, called upland boneset, is a taller, smoother plant, with scaly flower clusters; this is found from the New England States west to the Mississippi and south. Boneset, or thoroughwort, is used as a tonic, and by housewives of previous times was steeped into a tea.

Bonheur, *Bo"nur',* **Marie Rosa** (1822-1899), a famous painter of animals, born at Bordeaux, France. She was educated under the direction of her father and in 1849 produced her first famous painting, *Plowing with Oxen,* which is now in the Louvre. Later she painted the well-known canvas *The Horse Fair,* which was bought by Cornelius Vanderbilt for $53,500 and presented to the Metropolitan Museum, New York. To facilitate her work she adopted masculine attire, and maintained near her studio a small menagerie, where she painted animals from life. Her canvases are numerous, and she was decorated with the Cross of the Order of Leopold by the King of Belgium, the Cross of the Legion of Honor, the Cross of the Order of Isabella the Catholic by the King of Spain.

Bon Homme Richard, *Bo nom' Re shahr',* the flagship of John Paul Jones in his capture of the English sloop *Serapis,* Sept. 23, 1779. It was an old-fashioned merchantman which had been refitted through the aid of the French Government. In the summer of 1779 Jones went to the eastern coast of Scotland with a small squadron of vessels, of which the *Richard* was chief. In cruising about he had done much damage. Finally on Sept. 23, while off Flamborough Head, he met a British fleet of merchantmen bound for the Baltic under consort of the *Serapis* and the *Countess of Scarborough.* Jones gave chase, and after nightfall a duel took place between the *Richard* and the *Serapis.* This contest was long and violent and later changed into a fearful hand-to-hand fight; for Jones had succeeded in lashing the two boats together with grappling irons. After several hours the *Serapis* surrendered. The *Richard* was so badly damaged that she sank next morning. In the meanwhile, the rest of the American fleet had captured the *Countess of Scarborough.* This was the most famous naval victory of the Revolution and it gave great prestige to the American navy. See Jones, John Paul.

Bon'iface, the name of nine popes, of whom four are of historical importance. Boniface II was the first pope to claim the title of Universal Bishop of Christendom. Boniface V gave special attention to christianizing England. Boniface VIII (1294-1303), Benedetto Gætano, was the most eminent of any pope of this name. He forbade payment or collection of taxes on Church property, except by consent of the Holy See. He instituted the Roman Jubilee, and in 1302 issued the bull proclaiming subjection of the temporal to the spiritual power, as essential to salvation. Boniface IX acquired almost absolute power in Rome.

Bonn, University of, a celebrated university of Prussia situated in the city of Bonn. It was founded in 1818 and is one of Germany's leading educational institutions. It has a great library of 300,000 volumes, a fine museum of antiquities, an observatory, an agricultural experiment farm, a museum of natural history and an excellent collection of minerals. Its enrollment averages about 2400.

Bonnat, *Bo"na',* **Léon Joseph Florentin** (1833-), a French portrait painter, born at Bayonne. He studied in Madrid and Paris and first became known through religious paintings. His fame as an artist lies chiefly in his work as a portrait painter, and his portraits of Victor Hugo, Don Carlos, Leon Cogniet and Jules Grévy are especially well known. Bonnat has the gift of suggesting in the portrait the physical presence of his subject to a remarkable degree. He was elected a member of the Institute in 1881 and received the Grand Cross of the Legion of Honor in 1900.

Bon'net, a clŏth covering for the head worn by women and children, which projects over the face and is fastened on by means of strings that tie under the chin; also a small brimless hat or hood,

though the poke bonnet, worn in the middle of the century, was wide-brimmed. The conical cap of the Greek soldier, that of the Roman artisan, the Phrygian cap and the modern fez are forms of bonnets that have been worn at various periods. In the 15th century the bonnets of women assumed enormous proportions, towering in a pyramid several feet in height. The bonnet-Lairds of Scotland were so called because of a peculiar kind of blue woolen headdress with a red tuft on top worn by them. The French Revolutionists wore a sort of bonnet or cap called the *bonnet-rouge,* by which they were distinguished.

Boo'by, a name applied to certain sea birds of the Gannet Family which live on tropical and subtropical coasts. They are birds of powerful flight, obtaining their food, which consists of fish, by diving. These birds are stupid and will allow a person to approach without making a movement to fly. The man-of-war bird, or frigate pelican, preys upon the booby, compelling it to give up the fish which it has caught, and frequently causing it to disgorge a freshly swallowed fish. A common American species is about 30 inches long and is sooty brown above and white below. The nest is a slight hollow in the ground with a lining of grass. One or two eggs are laid. The young are born naked and must be brooded until the white down appears. The young birds are not able to care for themselves until about two months old.

Book, a collection of written or printed sheets bound together and enclosed in a case called a cover. The modern book is the result of centuries of development. Before the invention of material for writing, records were engraved on stone or wood. The Babylonians made their records on soft clay tablets, which were hardened by drying. The ancient Egyptians used papyrus (See PAPYRUS), and the Romans used wax tablets. The Egyptians pasted the sheets of papyrus together so as to form a long sheet, which was protected by being rolled around a stick, forming a *volumen,* from which the word *volume* is derived. Many of these papyrus rolls have been found in the coffins of mummies taken from tombs in Egypt, and, though some of them were written thousands of years ago, the writing on them is as distinct as when made. In the course of time papyrus was replaced by parchment, a specially prepared sheepskin, and in the tenth century paper came into use.

The paper first used was rough and of a light brown color. The writing was done almost entirely by monks, and it required a year for one man to transcribe a book containing as much matter as is found in an ordinary school reader or history of 500 pages. The beginnings of the chapters and sometimes the first word on each page were written in red, blue or gold, or in a combination of colors, the letters being set in an elaborate design, the whole forming what is known as "illuminated writing." When several copies of a book were wanted, as many writers might be employed, all writing from the dictation of a reader. This method was objectionable because it led to many errors. The first book printed from metal type was probably the so-called Mazarin Bible, which is supposed to have been issued about 1453.

As long as the paper used was made by hand, the sheets were of uniform size. A sheet folded once was known as a folio; if folded twice, a quarto; if folded three times, an octavo; four times, a duodecimo, or 12mo, and so on. But with the advent of paper-making machines and the increase in size of printing presses, these terms became misleading, and now in the United States the size is indicated by the measure of the length and breadth of the leaf in inches.

Books were formerly illustrated chiefly by steel engravings and woodcuts, and sometimes copperplates were used, but now plates made by the various photo-mechanical processes, such as half tones, zinc etchings, photo-engravings and photogravures, are most generally employed (See PHOTO-ENGRAVING; PHOTOGRAVURE; HALF TONE; ZINC ETCHING). Besides the subject matter, a book should

contain a title page, setting forth its title, with name of author, publisher and date of issue, a preface stating the plan or purpose of the book, a table of contents, and an index, particularly if it is a work of any size.

The making and selling of books is now one of our largest industries. It is estimated that the value of books produced annually in the United States amounts to at least $100,000,000, including books of fiction, travel, law, medicine, theology, education and for children. See BOOKBINDING; TYPE; PRINTING PRESS.

Book'bind"ing, the art of fastening together the different parts of a book and enclosing them in a case called a cover. After the sheets have been properly folded, either by hand or machine, into what are called "signatures," they are gathered together in their serial number and arranged with whatever illustrated sheets are used, and put in a press, where they remain for some time. They are then removed to the machine for sewing. On the back of the book is arranged from three to five stout cords, which have been sewed in, and these and the back are covered with a coating of glue. When this has dried, the book is placed in a vicelike press, and is hammered so as to round the back.

If the book is to be bound in leather, boards forming the cover are first fastened to the book by gluing them to the cords, the ends of which have been left long for this purpose. After the outside cover has been pasted on and is dry, the edges are folded over and pasted on the inside of the cover. Afterwards the cover is lined with paper and the lettering or design is put on the cover and back, and the book is put into a press to dry. If a cloth cover is used, it is made complete before it is put on the book. In large binderies these covers are made entirely by machinery. The edges of the book are finished in different ways. They are sometimes left plain, sometimes trimmed, or they may be sprinkled with coloring matter, gilded with a gold mixture or gold leaf or serrated to form the deckle edge. Uncut edges mean that the front edge of the leaf is left as it was folded.

Bindings are known as cloth bound, whether of muslin, buckram or silk; full leather, when the entire cover is of leather, like law books. A half leather usually has the back and the corners of leather, with the boards covered with cloth or paper. A three-quarter leather contains more covering of leather than the half leather. Handsome or valued books are generally bound in full leather and ornamented by gilded designs sunk in the leather, either by dies in a machine or by hand tooling. The leathers usually employed for binding books are sheepskin, for law and medical books; morocco, for fine books; and calfskin, variously prepared, for miscellaneous books. See LEATHER; BOOK.

Book'keep"ing, the science and art by which pecuniary transactions are so recorded and classified that business may be conducted with both economy and efficiency. Whatever system is used, three books are commonly considered essential: the daybook, journal and ledger. The first is the book in which all the details of transactions are recorded, and all such entries should be made on the day that they occur. Black ink is used. This being the book of original entry, it is the one which must be taken into court if legal complications arise. Entries should therefore be made with the greatest exactness, with all necessary detail, and must be absolutely legible. If errors do occur, the entry should simply be marked *Void,* and a correct entry made. Erasures or cancellations discredit the bookkeeper in every case in which they occur. An abbreviated record of each transaction is made up from the daybook and set down in the journal. This is called journalizing. It demands some knowledge of the particular business and a clear grasp of the principles of bookkeeping. In many establishments the modern daybook-journal has, however, taken the place of two separate books, and thus the cost incident to copying has been eliminated. By the adoption of

loose-leaf and card systems, original entries may now be made by the many widely-scattered agents of a firm at any time. These, upon being received at the bookkeeper's office, are at once promptly filed with the daybook-journal entries of that agent. Though separate volumes be used for the accounts of cash, sales, invoices, orders, etc., these are essentially a part of the daybook or of the daybook-journal.

The ledger contains all classified accounts, each item being separately transferred from the journal or daybook-journal entry to its proper ledger account. The transferring of items to the ledger is called posting, and, though a purely mechanical process, is no unimportant task, because it requires absolute accuracy.

Double Entry. In double-entry bookkeeping every original entry contains a debit item or items, and also one or more credit items which give the same total. If, therefore, office supplies to the amount of $100 are purchased from John Doe, the office expense account will be debited for $100, while *Cash* may be credited for $50 paid on receipt of the goods, and *John Doe* credited for the $50 which must be paid later. After these items have been posted, the total of the ledger debits, though increased by $100, still equals the total of ledger credits, since the one debit item posted equals the two credit items.

A sheet showing the total of all ledger accounts, and the total of debits and credits under each, is called a trial balance. A trial balance should be prepared monthly, and oftener if practicable. If special books are used for such accounts as those of Cash, Stock, Sales, etc., and these accounts are not posted to the ledger, they must also be included in the trial balance. The trial balance shows merely that the debits equal the credits, and does not of itself prove that the various accounts are correct.

Whenever a business is closed out, or reorganized, and once or twice a year under ordinary conditions, each ledger account should be closed, the sum necessary to balance it being entered in red ink, double red-ink lines drawn below the totals of debits and credits, and underneath these the red-ink balances again entered. In this work a red-ink credit above the double rulings becomes a debit below the double rulings, since it represents the excess of all black-ink debits over the corresponding credits. If an account shows a loss or gain, the balance should be transferred to the Loss and Gain account. This may be done directly, or by making a suitable entry in the journal and posting the same to the ledger. A balance of balances should then be taken from the ledger. From this a statement of the business can be quickly prepared. The statement is an analysis of the business. It must show all resources, including the inventory of equipment and of goods owned; all liabilities, the total of losses and gains, and net loss or gain; and finally the present capital of the business.

Single Entry. In single-entry bookkeeping there is a less complete record of transactions. Hence this system should be used only in a small business. Sums due the business are debited in the daybook to the party who owes these. Those parties are credited to whom the business from time to time becomes indebted. All daybook items are posted to the ledger. By taking an inventory, checking up the cash on hand, and finding the excess of ledger debits over ledger credits, or vice versa, the condition of the business may be determined and a statement prepared. See Study Guides.

Book'worm", a name given to a number of beetles, mostly of the Ptinus Family, whose larvæ live between the covers of books and feed upon their pages. Probably few realize the damage done by these insidious insects, which are seldom seen and whose name is more often used in sport than in seriousness. Their presence in a book may generally be detected by a fine line of brown, gray or reddish dust in the depression made by the hinge of the binding upon the first or second leaf of the book. When this is found, if a knife be inserted

between the page and the binding, a tiny beetle, rarely an eighth of an inch in length, is apt to be discovered. The species most commonly found is a plump-bodied insect having two long, slender antennæ and a rounding head; its larva is a soft, six-legged "worm" having a bristly white body. It moves slowly but is extremely destructive to manuscripts and volumes, both old and new. Bookworms are not frequently found because, naturally, they inhabit little-used volumes.

As yet no means is known of preventing their entrance. Poisoned paste and insect powder seem of little avail. Books and shelves should be kept well dusted, as the eggs are deposited in dust, and bindings in which the worms are found should be carefully scraped to remove any eggs left in the book.

Boom'erang, a weapon of the native Australians. It consists of a piece of hard wood about three feet long, curved like a scimiter, flat on one side and somewhat rounded on the other. It has a sharp edge and is thrown at the object desired with the cutting edge forward. Its most noticeable characteristic is that, if properly thrown, it returns to the thrower, unless it comes in contact with considerable resistance. It has been known to cut off the head of a bird and return.

Boone, Daniel (1735-1820), a famous American pioneer and hunter, born in Bucks Co., Pa. His parents were Quakers, and his mother was of Welsh descent. When Daniel was three years old, the family removed to the Valley of the Yadkin, on the frontier of North Carolina. Here Boone grew to manhood. His education in books was limited to reading, writing and enough of mathematics to enable him to become a surveyor. But the great forest, with its trees, birds, animals and wild flowers, was his teacher and he became so skilled in woodcraft and Indian lore that he was the equal of the most crafty Indian. When a young man, he was often absent from home for months at a time on hunting and exploring expeditions.

In 1755 Boone joined Braddock's ill-fated expedition as wagoner and blacksmith. He escaped being captured, and the year after his return home he married Rebecca Bryan, whose adventurous spirit well matched her husband's. About this time an Indian war broke out in the South, and for five years Boone took a leading part in protecting the frontier. After the Indian troubles were temporarily over, Boone resumed his hunting, and in 1760 went as far west as the mountains of eastern Tennessee, where, until recently, a tree was standing, with this inscription carved in its bark: "D. Boon cilled A BAR on this tree year 1760." In 1765 he went to Florida, and in 1767, with one or two companions, he crossed the mountains into eastern Kentucky, where they spent the winter. In 1769 Boone and a few others joined an expedition under John Finley, who led them through Cumberland Gap, where Boone spent nearly two years in hunting and trapping.

In 1773 Boone determined to establish a settlement in Kentucky. He organized a company of settlers who started westward with their families. They were delayed for a year and a half, however, by Lord Dunmore's War, a conflict with the Indians extending from Ft. Pitt to Cumberland Gap. Boone took a prominent part in putting down the Indians. He was made captain and placed in charge of three forts. In 1775 Boone and his followers established the town of Boonesboro on the Kentucky River. The Revolutionary War caused further Indian disturbances, and in the winter of 1777-78 Boone and a number of companions were captured by the Indians. Boone was adopted by a band of Shawnees and made the "son" of a chief. He was closely guarded, but, learning of an intended attack upon the settlements in Kentucky, he managed to escape. He traveled 160 miles through the forest in four days and reached Boonesboro in season to prepare for the attack and defeat the Indians. During the remaining years of the war he was remarkably

successful in defending the frontier against Indian invasions.

After the close of the war Boone was constantly in demand as a guide and surveyor. He had preempted much valuable land in his own name, but he failed to have the entries recorded in legal form, and when Kentucky became a state his lands were taken from him by ejectment suits. Disgusted at the unjust treatment he had received, he left Kentucky in 1788 and settled in Virginia, where he remained for a few years. In 1781 he represented Kentucky in the Legislature at Richmond, and in 1790 he represented Kanawha County in the same body. Becoming restless as the number of settlers increased, Boone again removed to the frontier and located on Femme Osage Creek in Missouri, about 45 miles west of St. Louis. Here the Spanish Government granted him a large tract of land, but, through his carelessness in regard to titles, he was dispossessed of this soon after the territory became a part of the United States. However, in 1810 Congress by special legislation confirmed the Spanish grant, accompanying it with words of praise for "the man who has opened the way for millions of his fellowmen." Here he spent the last 20 years of his life in satisfaction and contentment, dying at the age of 86. In 1845 his remains were removed to Frankfort, Ky., at the request of the Kentucky Legislature, where a suitable monument has been erected to his honor.

Boone was neither the first explorer nor the first settler of Kentucky, but his eldest son was the first male white child born within her borders. His wide wanderings and thrilling adventures have led to his adoption as the typical backwoodsman of the West, and made him one of the most lovable and picturesque of American heroes.

Boone, Iowa, a city and the county seat of Boone Co., 43 m. n.w. of Des Moines, near the center of the state and near the Des Moines River. The Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Newton & North Western and other railroads enter the city, which is also the headquarters of the Ft. Dodge, Des Moines & Southern interurban railway. In the surrounding agricultural region are raised grain and live stock, coal is mined in the vicinity, and near-by clay deposits have given rise to brick and tile manufacturing. There are also beef- and pork-packing plants, machine shops, carriage and plow works and flour mills in the town. Boone has a Federal Building, an opera house, a public library and a hospital. The place was settled in 1848, and in 1866 incorporated as a city. Population in 1920, U. S. census, 12,451.

Bootes, *Bo o′ teez,* the Bear Driver, an equatorial constellation somewhat resembling a kite. At the end of the long angle where the tail of the kite should be attached is Arcturus, spoken of in *Job, ix, 9,* a magnificent star of the first magnitude. About halfway up the left side of the angle is Mira. Three smaller stars form the top of the kite. In mythology Bootes forever drives the Great Bear around the North Pole. See ARCTURUS; CONSTELLATIONS; STARS; GREAT BEAR.

Booth, Edwin Thomas (1833-1893), a famous American actor, son of Junius Brutus Booth, born at Belair, Md. Brought up to the stage, he made his first regular appearance in Boston when 16, and, having acted for several years in California, Australia and the Sandwich Islands, he again appeared in Boston in 1857, this time with immense success. Thenceforth his dramatic triumphs were warmly acknowledged. In 1862 he became manager of the Winter Garden Theater in New York, where he gave a series of Shakespearean productions with what was then unexampled magnificence. Some six years later he built his own Booth's Theater in New York, and with an excellent stock company enjoyed artistic and financial success until the panic of 1873 made him a bankrupt. He recovered his fortune, however, with his tours in the years that followed, and in 1882 formed a partnership with Lawrence Barrett, with whom he continued to appear until the latter's death in 1891. Booth was considered the greatest tra-

gedian of his time, Hamlet being his most popular rôle, though his Lear, Othello, Shylock and Richelieu were especially admired. He was founder and first president of the Players' Club.

Booth, Maud Ballington Charlesworth (1865-), a religious and social reformer, wife of Ballington Booth, founder of the Volunteers of America. She was born in Surrey, England, the daughter of a wealthy clergyman, and received part of her education in Switzerland. Having joined the Salvation Army when 17 and been associated with its work in Paris and in Switzerland, she married in 1886 and came to America the following year. Here she and her husband engaged in the reform and relief work of the Salvation Army until 1896, when they founded the Volunteers of America. Mrs. Booth has had marked success in her prison work throughout the United States and, besides attaining distinction as a lecturer, has written among other works *Branded, Look Up and Hope* and *After Prison—What?* See VOLUNTEERS OF AMERICA.

Booth, William (1829-1912), the founder of the Salvation Army, was born and educated in Nottingham, England, and was a minister of the Methodist connection from 1850 to 1861. In 1865 he engaged in missionary work among the lower classes of London, and by 1878 he had developed his religious military system called the Salvation Army. His wife was fully associated with him in his work. He published several hymn books, and in his best-known work, *In Darkest England and the Way Out,* makes many practical suggestions for the alleviating of poverty and the suppressing of vice. General Booth's eldest son, Bramwell Booth, succeeded to the leadership of the Salvation Army on the death of his father. See SALVATION ARMY.

Boots and Shoes, coverings for the feet. The shoe is one of the oldest articles of dress and is a development of the sandal, which, in its simplest form, consisted of a sole fastened to the foot by a thong. The shoe is a covering for the foot, and the boot is a shoe with a leg or a covering for the foot and leg. From the time of the ancient Egyptians to the end of the 19th century, the boot was highly fashionable among all European nations and also in the United States and Canada. In France, Spain and England it was an article of court dress, and a pair of boots with large and elaborately decorated spurs constituted an important part of the knight's outfit. Later the Jack boot became indispensable to cavalrymen and horsemen generally. Early in the 19th century top-boots were worn by gentlemen in England and were also much esteemed in the United States; but at the present time their use is confined almost entirely to coachmen and grooms, the shoe having taken their place for general wear.

MANUFACTURE. Until recent times all boots and shoes were made by hand. In the early days of the New England Colonies the shoemaker went from house to house and made from each family's stock of leather such footwear as was needed. When the colonies became more densely populated, the shoemaker erected a shop and let his customers come to him. All work was done by hand and the tools consisted of the knife, the awl, the hammer and the lapstone. When his work required it, the shoemaker hired a boy, whom he taught the trade. As business increased, men were hired and larger shops were built. However, each workman began and finished his pair of shoes, performing all the operations necessary. Finally the work was divided; some workmen were set to cutting out the parts, others to sewing the parts together, others to fastening the uppers to the soles and still others to finishing and packing. This was the beginning of the modern shoe factory.

The first machine used in making shoes was the rolling machine, which took the place of the lapstone for making the sole leather even and compact. This machinery would do in a few minutes what required a half hour by hand. But the modification of the sewing machine, so as to adapt it to sewing shoes, was the greatest step in the evolution of the shoe

industry. The next great step was the invention of the welt machine, which cuts a groove in the sole so as to protect the thread by which the sole is sewed to the uppers.

In making shoes by machinery, the first step is the cutting out, by patterns, of the different pieces of cloth and leather, such as soles, heels, linings, etc. The next step is the sewing of these parts together by different machines, each doing only a special part of the sewing, the pieces passing from machine to machine until ready to be fastened to the sole. The soles are usually stamped out or cut and shaped by special machines and afterwards pressed into form. The inner sole is tacked to a last, over which the uppers are drawn and held, while the outer sole is tacked on. The last is now removed and the shoe is sewed on a special machine. After this the heel is put on by a machine that presses it in place and nails it on the sole at the same time. The shoe now goes to a room where the heel is ground and polished, and then to a machine for finishing the sole. The sole and heel are now polished and colored. If the shoes are made for laces they are put in; if for buttons, these are attached by a special machine. Shoes of the best quality are wrapped in tissue paper and each pair is put in a box by itself. Cheap shoes are packed in large cases containing several dozen pairs.

All the machinery in the modern shoe factory is controlled by a corporation owning the patents and machines, and they usually rent the machines on a royalty basis by getting so much money for each pair of shoes made. Most of the shoes made in the United States are produced in New England, but there are several very large factories in Illinois and Missouri. While the entire production of this country amounts to about 250,000,000 pairs each year, valued at about $1,000,000,000, we export nearly 10,000,000 pairs.

Bo'rax, a colorless or white substance made up of boron, sodium and oxygen crystallized with water. When heated, it loses the water and melts, forming a clear glass. Borax was once found in great quantities in Tibet and was exported from China under the name of *tincal*. At present the principal sources of supply are California, Nevada and the borate of lime deposits of Bolivia. When produced from borate of lime, the mineral is boiled with water and soda ash, from which the borax crystallizes. Another source of manufacture is the soda and boric acid of natural springs. Borax is used in the arts, in the manufacture of beads, glass, porcelain and enamel, and as an antiseptic or cleanser in laundry work; with certain metals it is used for soldering.

Bordeaux, *Bor"do',* a city of France, capital of the Department of Gironde, situated on the Garonne River, 359 m. s.w. of Paris. It is one of the finest and most flourishing cities of France. Surrounding it is a semicircle of boulevards, and along the river stretches a crescent of quays beyond which rise the huge warehouses, with towers and steeples in the distance. The promenades and gardens are beautiful and contain many handsome statues. Among the buildings are the Cathedral of St. André, the churches of St. Seurin, Ste. Croix and St. Michel. With the last is connected the bell tower, which has the highest spire in the south of France. Other buildings include the palace of the Faculties of Science and of Letters, the Hôtel de Ville, the bourse, the custom-house, the Palais Gallien, the law courts, several educational institutions, museums and a large library.

The industries are represented by shipbuilding yards, sugar refineries, cotton and woolen mills, soap works, distilleries, potteries, oil works and factories for the manufacture of tobacco, machinery, chemicals and chocolate. It is an important trading center, maintaining relations with almost all countries, and its well-known wines are shipped to all parts of the world. Among the principal sights of the city are the wine cellars of the quays. It was a flourishing commercial center under the Roman Empire, be-

longed to English kings from 1154 to 1453, but was restored to France under Charles VII. Population in 1919, 300,000.

Bor'den, Robert Laird (1854-), a Canadian statesman born in Nova Scotia. At the age of 24 he began the practice of law, becoming connected with the firm of which Sir Charles Tupper and Sir John Thompson were members. Mr. Borden rose rapidly in his profession and was recognized as the leader of the bar in Nova Scotia. In 1896 he was persuaded to become a candidate for Parliament and was elected for Halifax. He began his career as a Liberal, but later became a Conservative. When he first entered Parliament he seldom spoke, but his ability was soon recognized and in 1901 he became leader of the Opposition. He led the fight for giving the provinces, subject to the right of appeal to the Federal Government, exclusive control of their public schools and won, but the victory lost him the support of the French population and some of the English Conservatives as well. He lost his seat for Halifax, but was persuaded to accept a seat for Ontario and continue his work. Under his wise leadership his party began to gain strength, and in 1908 he regained his seat for Halifax. At this election one-third of the representatives returned from Nova Scotia were Conservatives, which greatly strengthened Borden's position.

Borden is a firm believer in an entirely independent fiscal policy for Canada. Since reciprocity with the United States would interfere with this policy, he opposed with all his power the proposition to negotiate such a treaty in 1911. On this platform the Conservatives returned to power and Mr. Borden became prime minister. He states his position regarding the relation of Canada to the British Empire and to the United States thus:

"Canada is an autonomous nation within the British Empire and is closely and inseparably united to that empire by ties of kinship, of sentiment, and of fealty, by historic association and tradition, by the character of its institutions and by the free will of its people. By the like ties of kinship, by constant social and commercial intercourse, by proximity, and by mutual respect and good will this country is closely associated with the United States. Canada's voice and influence should always be for harmony and not discord between our empire and the great republic; and I believe that she will always be a bond of abiding friendship between them. I trust that the anniversary of 100 years of peace will be commemorated in the two countries with a deep and solemn sense of national responsibility."

In 1914 he received the title of Commander of the Cross of St. Michael and St. George.

Borgia, *Bor' jah,* the name of an Italian family famous in the 15th century.

CESARE (1476-1507), son of Rodrigo Borgia, who became Pope as Alexander VI. Cesare was the type of the adventurers of the Italian Renaissance period. He is held up as the model prince by Machiavelli. He failed in his attempt to establish an independent kingdom in central Italy, and he played no prominent part in Italian affairs after his father's death. He was killed while serving under the King of Navarre.

LUCREZIA BORGIA (1480-1519), Duchess of Ferrara and daughter of Rodrigo Borgia, afterward Pope Alexander VI, was famous for her beauty and charm. Her name was long connected with the grossest crimes, but careful study has shown that the more extravagant of these assertions were without foundation.

Boring Machines, mechanical devices for piercing wood, metals, rock, leather, etc. The augur is used to bore large and medium-sized holes in wood by hand power, while the gimlet performs smaller but similar work, and the awl is used principally to pierce small holes in leather. For making holes in metals and stone, drills are used and are operated either by steam or compressed air. The diamond drill, having a hollow tube surrounded with black diamonds as cutters on one end and being rotated, cuts out a

core which can be inspected, and is, therefore, used for prospecting and deep boring in rock and ores. Carpenters employ a bit with a brace to bore holes in wood.

Bor'neo, an island of the Malay Archipelago, the fifth largest in the world. It is bounded on the n. by the China and Sulu seas, on the e. by the Celebes Sea and the Strait of Macassar, on the s. by the Java Sea and, on the w. by the South China Sea. The total length is 600 m. and the area about 293,500 sq. m., making it about the size of Texas and Indiana. The Madei Mountains stretch along the center of the island and with surrounding ranges form highland regions with deep intervening valleys. Floods are frequent, and the climate is hot but not unhealthful. The animal life is varied and numerous, and represented by many peculiar species, particularly of fish and insect life. Forests are large and contain impenetrable underbrush. The trees yield camphor, dragon's blood, gutta-percha, gums and resins. Among the important minerals are gold, iron, tin, zinc, antimony and coal.

The political divisions of Borneo, include the British and Dutch possessions. To British Borneo belong Saba, Brunei and Sarawak. Dutch Borneo includes West Borneo and South and East Borneo. The native population belongs principally to the Malay family. The chief exports are rattan, gutta-percha, edible birds' nest, trepang and timber.

Bo'ron, an element not found free in nature, but when separated chemically it is in the form of a brown powder which burns in the air, uniting with both oxygen and nitrogen. It is found as a constituent in borax, its most important compound; in deposits of borate of lime in Bolivia, and in boric acid in the jets of steam which issue from the ground in some volcanic countries. In Tuscany the preparation of boric acid from this steam is a profitable industry. See BORAX.

Bosnia, *Boz' ni a,* or **Bosnia-Herzegovina,** *Her"tse go ve' nah,* one of the provinces of Jugo-Slavia, bounded by Croatia and Slavonia on the n., Servia on the e., Montenegro on the s. and Dalmatia and Croatia on the w. Bosnia is completely inland, and Herzegovina, although it has a few miles of seacoast upon the Adriatic, has no satisfactory harbor. The country is mountainous and contains within its borders some of the highest peaks of the Dinaric Alps. Because of these mountains, which lie in a wall along the western border, the most of the rivers are tributary to the Danube and none of the large streams enter the Adriatic. The mountains are rich in minerals; gold and silver were mined by the Romans in early times, while at present coal, iron, copper, chrome, manganese, zinc and cinnabar are obtained. Marble and building stone are quarried in many sections and deposits of asphalt and lignite are also found. Aside from mining, agriculture is the chief occupation. The climate of Bosnia is uncertain; fierce storms are not unusual, though the snowfall is light. Herzegovina is almost tropical in climate.

The people are Slavic in ethnology, and came into the country with the great Slavic immigration in the seventh century. They passed under the control of Turkey in the fourteenth century, and remained a province of Turkey until 1878 when the Congress of Vienna placed that province under the protection of Austria, though nominally it remained a part of Turkey until 1908. The people in this section for some reason were more responsive to Turkish influence than other South Slavic people, and quite a large part of them accepted the Mohammedan faith; but here, also, consciousness of racial unity with other southern Slav people was growing, and Bosnia-Herzegovina is now a part of Jugo-Slavia. It is interesting to recall that the assassination of the heir to the Austrian throne, Francis Ferdinand, in 1914, at Seravejo, capital of Bosnia, precipitated the World War. (See JUGO-SLAVIA.)

Bos'porus, or **Bosphorus,** the narrow channel connecting the Black Sea and the

Sea of Marmora and separating the continents of Europe and Asia. It is about 18 m. long and has a width varying from 1800 ft. to 2 m. It has a depth of over 100 ft. The surface current comes from the Black Sea, while a saline current runs underneath in the opposite direction. Along the shores, near Constantinople, are vineyards, picturesque villages and handsome residences. When Darius marched against the Scythians he constructed a bridge of boats across the middle of the channel. It is often called the Thracian Bosporus to distinguish it from the Cimmerian Bosporus which leads from the Black Sea into the Sea of Azov. The Bosporus occupies a conspicuous page in the turbulent history of Eastern Europe from earliest times to the downfall of Turkey in 1918.

Bos'ton, Mass., the capital of the state, the county seat of Suffolk Co. and the chief city of New England, situated on Boston Harbor, an arm of Massachusetts Bay, at the mouth of the Charles and the Mystic rivers, 232 m. by rail n. e. of New York City, and on numerous lines of the Boston & Maine, the New York, New Haven & Hartford and New York Central railway systems.

General Description. The business section and the oldest part of the town occupies a peninsula lying between the harbor on the east and the Charles River on the west. This peninsula is irregular in outline. Originally it contained about 780 acres. Within its boundaries were three elevations, Beacon Hill, Copp's Hill and Fort Hill, each famous in the early history of the colony. These hills, with the exception of Beacon, have been cut down and the earth has been used in filling up the tidal marshes and the bay on the west side, forming the Back Bay district. By this means nearly 1000 acres have been added to the original area. Various additions have been made from time to time by annexation, among which are East Boston, on Noddle's Island; South Boston, Roxbury, Dorchester, Charlestown, Brighton, West Roxbury and Hyde Park, so that the area now included within the corporate limits is about 47 sq. m. The old part of the city is compactly built, and the principal streets all radiate from Scollay Square, which is near the center of the peninsula. The longest streets extend approximately north and south through the peninsula and then bend slightly to the southwest. These streets are connected at frequent intervals by cross streets. Because of the shape of the peninsula, the blocks are irregular in size and shape. The newer parts of the city are regularly laid out with streets crossing at right angles. Tremont, Summer and Washington are important business streets, and State Street is the great financial center, corresponding in this respect to Wall Street in New York. Just north of Charles River is Charlestown, which includes Breed's and Bunker hills and a United States navy yard (See Bunker Hill, Battle of). In the western part of the city is the most fashionable residential section, which extends to Brookline, a very beautiful suburb. Cambridge, the seat of Harvard University, is west of the Charles River, which is crossed by several bridges. Of these the Cambridge Bridge is noted for its strength and beauty of design. See Cambridge, Mass.

A complete system of street-car lines, subways and electric lines enables one to reach any part of the city quickly and conveniently. Many surface lines also connect with interurban lines, so that Boston has excellent means of communication with all surrounding cities and towns. The railways entering the city from the north meet in the North, or Union, Station, and those entering from the south meet at the South Station. This station is 700 ft. wide and 800 ft. long, and at the time of its completion was the largest railway passenger station in the world. East Boston is connected with the main city by tunnel and by ferry. In all the city has about 560 m. of streets, nearly all of which are well paved.

Parks and Boulevards. Boston Common, an irregular tract of land of about 50 acres and situated in the heart of the

city, is the oldest, the most widely known and, historically, the most interesting public park in America. It is unique in situation, in that it occupies what must otherwise be the exact business center of the town. Its use as a playground dates from the early settlement of the city. Within it have occurred numerous events of historic interest. The Common is beautified by large elms and other trees and contains a number of monuments and statues of great merit.

Adjoining the Common on the southwest is the Public Garden of 24 acres. In the center of the garden is an artificial pond, spanned by an iron and stone bridge. The garden contains a large number of varieties of trees and shrubs. Near the Arlington Street entrance is the equestrian statue of Washington, by Thomas Ball, which is considered one of the six great equestrian statues of the world. Another monument in this part of the garden commemorates the discovery of the use of ether as an anæsthetic. Extending from the center of the Public Garden to the southwest is Commonwealth Avenue, the finest boulevard in the city, and one of the finest in the United States. It is 240 ft. wide and has four rows of trees shading the central mall. This avenue forms the connecting link, through the Back Bay Fens, with the outer park system. Massachusetts Avenue is the next boulevard in importance. The outer park system consists of two circles of parks and parkways, the inner circle lying within the city limits and being wholly under metropolitan control, and the outer lying mostly without the city limits and being under the joint management of the city and the state. The inner circle, which has been developed since 1875, contains about 2658 acres of parks and more than 110 m. of walks and drives. There are, in addition, within the city limits, 1053 acres of Metropolitan parks and parkways under state control. This fact, with the unusual beauty of such suburban regions as Milton, Newton and Brookline, has made Boston a favorite resort for automobile touring parties and for summer conventions. The inner circle of parks forms an unbroken chain from Cragie's Bridge on the north to City Point in South Boston. The principal parks are the Charlesbank, with a total extent of ten miles, which lies along the river between Cragie's and West Boston bridges; the Fens, a reclaimed region artificially laid out, with roads, bridle paths, walks and ponds leading to the parkway beyond; Olmsted Park, noted for its beautiful landscape effects; Franklin Park, which has an area of about 600 acres in a region of great natural beauty; and the Arnold Arboretum, which is under the direction of Harvard University but supported largely by the city. The arboretum comprises 223 acres and within its boundaries can be found every tree and shrub that can be grown in the climate of that region. Few American cities have done more for their citizens than Boston in the direction of furnishing public baths and playgrounds. Besides the Charlesbank Playgrounds are Franklin Field and the well-equipped bathhouses at South Boston and elsewhere. Northend Beach accommodates the crowded section on the north side. Marine Park, of 160 acres, affords a similar pleasure ground for South Boston, and East Boston has Wood Island Park, covering over 200 acres.

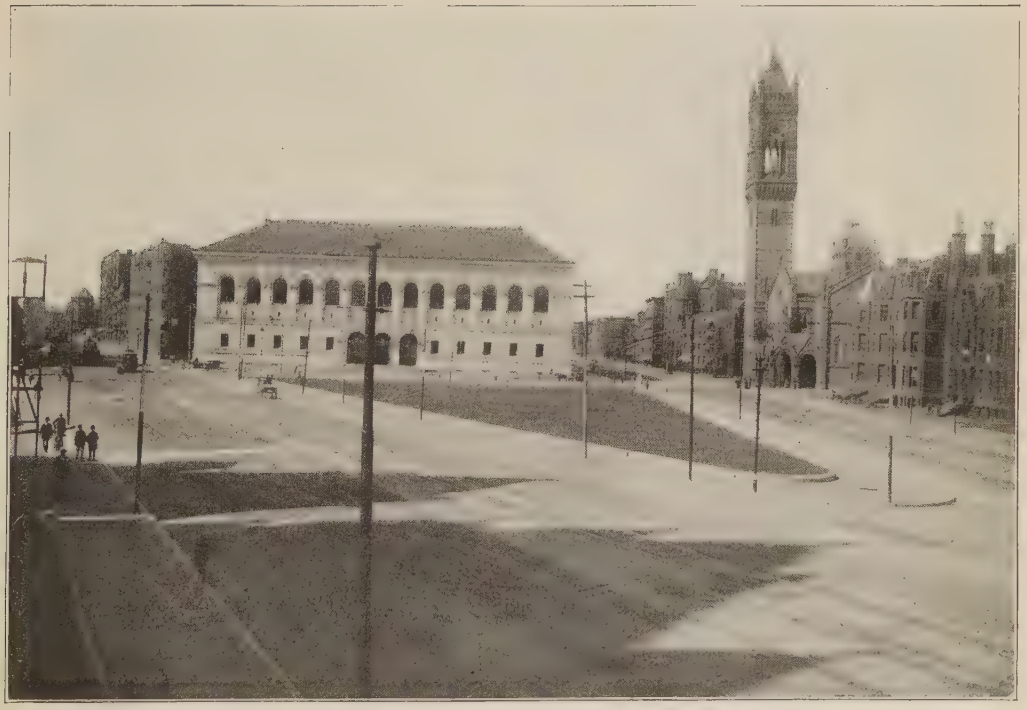
Places of Historic Interest. Many spots in the city are intimately associated with the stirring events which led to American independence. The progress of the city has made the removal of many of the old landmarks necessary, but most of those of greatest interest still remain, and where others have been removed their places have been marked by marble slabs.

Buildings. Among the celebrated historic buildings is the Old State House on Washington Street, at the head of State Street, built in 1748. Within and around this building occurred many stirring scenes connected with the Revolutionary War. A portion of the building is now used for a museum of historic relics.

OLD STATE HOUSE

FANEUIL HALL

"The Cradle of American Liberty."



COPLEY SQUARE, SHOWING THE PUBLIC LIBRARY AND THE NEW OLD SOUTH CHURCH

BOSTON

Another building of national interest is the Old South Meeting House on Washington Street (See OLD SOUTH CHURCH). Faneuil Hall, in Faneuil Hall Square and named for Peter Faneuil, is generally known as the "Cradle of Liberty" (See FANEUIL HALL). Christ Church on Salem Street, at the north end, is the church from whose belfry the lanterns were hung to guide Paul Revere in his midnight ride to warn the people that the British were marching upon Lexington and Concord (See REVERE, PAUL). King's Chapel on Tremont Street is a plain structure of dark granite. It occupies the site of the first King's Chapel built in 1689. The present building was completed in 1753. Previous to the Revolution it was the church attended by the royal governors and the officers of the British army.

Burying Grounds. Several of the old burying grounds have been preserved. The oldest of these is King's Chapel Burying Ground adjoining the Chapel on Tremont Street. For 30 years it was the only burying place of the town. Copps Hill Burying Ground on Hull Street was the second burial place. The Granary Burying Ground on Tremont Street near Park Street Church is perhaps the most interesting of all. Here are the graves of Paul Revere, Samuel Adams, Peter Faneuil, the victims of the Boston Massacre, the parents of Benjamin Franklin and John Hancock.

PUBLIC BUILDINGS. The State House on Beacon Hill adjoining the Common is the most noted public building. Its gilded dome can be seen from many parts of the city, and the building contains numerous statues of public men and other objects of interest. Other public buildings of importance are the city hall, the post office, the county courthouse and, in the business district, the modern substantial office buildings. The number of large office buildings, department stores and monumental bank buildings in the down-town district has been enormously increased in the last ten years, so that at present the most interesting part of Boston, architecturally, is its business district. Copley Square, halfway between the down-town district and Back Bay, was long the most remarkable center in the city. Around it are Trinity Church, said to be the finest church edifice in New England; the public library; the new Old South Church; the buildings of the Massachusetts Institute of Technology; and two of the city's great hotels.

Churches worthy of mention as among the finest in New England are the Roman Catholic Cathedral of the Holy Cross, the First Church of Christ Scientist and the first Spiritual Temple (Spiritualist). Among the leading commercial hotels are the Adams, the United States, the Parker House, the Quincy House, the American, the Thorndyke, the Touraine and the Copley-Plaza. The Bellevue, the Brunswick, the Copley Square, the Somerset, the Tuilleries and the Vendôme are the leading family and residential hotels. The leading theaters are the Boston, seating 3000; the Castle Square, the Colonial, the Wilbur, the Cort, the Hollis, the Park and the Tremont. Symphony Hall, erected for the Boston Symphony Orchestra, is one of the best music halls in the country.

The art center of Boston may now be said to have moved to the general region of the Fenway. In that neighborhood, besides the Opera House and Horticultural Hall, are the new Y. M. C. A. Building, which will house, among other activities, the foremost educational department in America for Y. M. C. A. work, the buildings of Simmons College and of the Harvard Medical School, the Boston Normal School, the Conservatory of Music, Mrs. Gardner's so-called "Italian Palace," and the new buildings of the Art Museum.

INSTITUTIONS. Boston has a large number of educational and philanthropic institutions, some of which have attained more than a national reputation. Among the leading educational institutions are: Boston University (Methodist Episcopal), incorporated in 1869; the Boston Normal School; the Boys' Latin School and the English High School, the former being the oldest public school in the

country; the Roxbury Latin School, founded in 1638; the Girls' Latin and High School; the Massachusetts Institute of Technology; Simmons College; the Normal Art School; and the New England Conservatory of Music. Harvard University in Cambridge, and Tuft's College in Medford are just without the city limits. The city has numerous public and private libraries of great value. Among these are the Boston Public Library, the Boston Athenæum, the Library of the Massachusetts Historical Society, the Natural History Museum, and the State Library of Massachusetts. At Harvard University are the extensive libraries of that institution. Boston has the distinction of having the largest public circulating library in the world (See LIBRARY); the number of volumes issued monthly for home use is in the neighborhood of 170,000. The building in which this great collection of books is housed was "built by the people and dedicated to the advancement of learning," and is one of the most widely known structures in America. The building, which is nearly square and surrounds a court, is constructed of Milford granite in the Italian Renaissance style of architecture, and covers, exclusive of the court, one and one-half acres. The objects of special interest in the interior are the entrance hall, with its tablets upon which are wrought the names of eminent Americans who have been identified with the city; the grand stairway, with the crouching lions by St. Gaudens upon either side of the entrance; and the panels representing the *Muses Greeting the Genius of Enlightenment* on the encircling walls; the public reading room, or Bates Hall, 217 ft. long and 42 ft. wide, with an arched ceiling, whose crown is 50 ft. above the floor; the delivery room, whose frieze contains a series of pictures by Edwin A. Abbey, representing scenes in *The Quest of the Holy Grail;* the great hall containing Sargent's representation of *The Religions of the World;* the children's room and the court with its fountain and balconies. Besides the central library, numerous branches are maintained in different parts of the city.

The Museum of Fine Arts, now housed in its new building on Huntington Avenue, contains valuable collections of statuary, paintings, medallions, coins and Japanese art. The Museum of Natural History contains valuable collections in zoology, botany and geology, all of which are admirably arranged for the study by pupils of the public schools.

INDUSTRIES AND COMMERCE. Boston is the center of a densely populated manufacturing district, is the most important railway center in New England and ranks second to New York only in its foreign trade. Its recent advances in every department of trade and commerce have been marked. It is now the first shoe and leather center, the first wool market, the fourth seaport, the second textile center, the third in amount of bank clearings and the sixth in the value of its manufactures. The city is commercial rather than industrial, but within a radius of 20 m. from Boston Common are made about all the different commodities that are manufactured in the United States, reaching the annual value of over $500,000,000. The harbor has an extent of eight miles along the water front. Extensive plans are now under way for beautifying and improving it at the public expense. From its docks about 1000 vessels a year leave for foreign ports, while as many more arrive. In addition to this is an extensive and growing coastwise trade with the Atlantic ports of the United States and Canada. There are also many extensive railway and insurance interests located here.

The greatest single improvement in the recent history of Boston is the Charles River Dam, which extends across the lower reaches of the river and forms a basin, above the level of tidewater, extending from Charlestown on the east to Watertown on the west. The total cost, including the embankments, has been nearly $4,500,000, 60 per cent payable by the city. This makes the river front accessible and attractive at all times for both residence and recreation. The total

river front on the Boston side has been either occupied or authorized for improvement for public purposes. Other public expenditures of recent years are a tunnel over a mile long under Washington Street, costing $8,500,000; a tunnel to East Boston ($3,300,000); the Cambridge Connection Subway ($1,300,000); and a new Cambridge Bridge ($3,000,000). When these facts are considered in connection with recent plans for improvement of railroad facilities, changes along the water front and direct passenger service connecting with Europe, they can be seen to point to a rapid development of the city.

HISTORY. The Indian name of the peninsula upon which the old town was built was Shawmut, meaning Sweet Waters. The first English settlement was made in 1630 by a company under John Winthrop and the place was named for Boston, England, from which a number of the settlers had come. In 1632 the first meeting house was built and the next year the first school. In 1632 Boston was informally made the capital of Massachusetts Bay Colony, and from that time the town grew rapidly and soon became the chief town of the New England Colonies and the center of religious and literary influence. The first grand jury in America met here in 1635. In 1649 a post office was established. In 1650 a mint, in which were coined the pine-tree shillings, was opened. A printing press was put in operation in 1674, and in 1704 the *Boston News Letter,* the first regular newspaper in America, began publication. In the stirring times preceding the Revolutionary War, Boston was the largest and most influential city in the country. During this time and until the close of the Revolution its history is closely interwoven with that of the country. See BOSTON TEA PARTY; LEXINGTON, BATTLE OF.

After the Revolution Boston prospered and grew rapidly. It was governed as a town until 1822, when a city charter was procured. The city was the center of the anti-slavery agitation previous to the Civil War, and during that struggle it gave loyal support to the government and furnished over 26,000 men for the Union army. In 1872 occurred the most disastrous fire in the city's history, laying waste over 50 acres of the business center. The burnt district was soon rebuilt, however, on a greatly improved plan. The city has extended its boundaries from time to time by the incorporation of adjoining suburbs within its limits.

Boston has always been a leading literary, educational and social center. Within its environs were the homes of Longfellow, Lowell, Whittier, Holmes, Emerson, Hawthorne and others of literary fame. Here were founded the *North American Review* and the *Atlantic Monthly,* periodicals that have exerted a profound influence upon the country.

POPULATION. For many years the population was purely American, but with the increase in immigration and the development of great factory systems in and about the city, immigrants began to arrive until now there is a mixture of nationalities. Most prominent among these are persons from the British provinces and from Ireland, the Italians and people of Russian birth. There are also some Germans. The majority of the inhabitants are still of American descent; but the statistics of the town at present in no way represent the real constitution of its people, on account of the fact that most native Americans, with business or property in Boston, now live in suburban towns. Population in 1920, 748,060. Consult *Historic Boston,* by Hale; *Boston,* by Lodge; *Old Landmarks and Historic Personages of Boston,* by Drake.

Boston Massacre, *Mas' a ker,* the name given to a conflict between a number of Boston citizens and seven British soldiers, March 5, 1770. It was the outcome of angry opposition on the part of Bostonians to the presence in their city in times of peace, of several regiments of British troops. The affair took place on King Street, now State Street, when a number of soldiers, taunted by a mob of men and boys, fired into the throng,

killing three citizens and wounding seven, two of whom died later. The soldiers, who were accused of murder, were tried as soon as public indignation had subsided. John Adams and Josiah Quincy defended them. They were all acquitted save two, who were branded in the hand for manslaughter. Lieutenant-Governor Hutchinson removed the garrison to Ft. William, which was out in the harbor, three miles from the city.

Boston Port Bill, the first of the five Intolerable Acts, passed by Parliament and signed by the King in March, 1774. The purpose of this act was to punish the citizens of Boston for having destroyed the tea in Boston Harbor, Dec. 16, 1773, and it was to be effective after June 1. It made provision for closing Boston Harbor to commerce, for the removal of the seat of government to Salem and for the replacing of Boston by Marblehead as a port of entry until the tea owners should be compensated and certain other indemnities be paid. This repressive measure roused widespread indignation. June 1 was kept as a day of fasting and prayer, and messages of sympathy and support poured in from neighboring towns and colonies, material help arriving from as far as South Carolina. The First Continental Congress was finally called to plan measures of relief. See Boston Tea Party.

Boston Tea Party, the name given to the deed of a body of Bostonians, Dec. 16, 1773. It was the result of colonial opposition to the levying of a Parliamentary tea tax. In the fall, the English East India Company sent several cargoes of tea to Boston, New York, Philadelphia and Charleston. At the various ports vigorous action was taken to resist the landing of the tea and the collection of the duty. Boston held indignation meetings at which it was unanimously voted that the cargoes should not be unloaded. Finally a band of 50 men, disguised as Mohawk Indians and armed with hatchets, boarded the three vessels and threw 342 chests of Indian tea into the sea. No one was arrested for the action.

Boston University, at Boston, Mass. (1869). This institution is open to both sexes. It includes the College of Liberal Arts, College of Business Administration, and graduate departments maintaining Schools of Law, Medicine, Science, Education, and Theology, and a Department of Religious Education and Social Service and provides postgraduate work in literature, philosophy and science. It controls property valued at $4,000,000. The faculty numbers about 262 and the students 4256.

Boswell, *Boz' well,* **James** (1740-1795), a Scottish writer, the biographer of Samuel Johnson, born in Edinburgh. He met Johnson in 1763 and a lively friendship sprang up between the two. During a brief stay on the Continent Boswell met Voltaire, Rousseau and Paoli, and in 1773 was proposed by Johnson as a member of the famous Literary Club of London. The same year the two made their tour to the Hebrides, an account of which was published by Boswell in 1786 in the form of a journal. During this period of close intimacy, which continued until Johnson's death, Boswell was preparing himself for the task of writing one of the most interesting biographies ever published. His *Life of Samuel Johnson,* revealing all the characteristics, follies and virtues of the man he admired and loved, is unexcelled in dramatic vitality, sympathy and scope.

Bosworth, *Boz'wurth,* **Field, Battle of,** the terminating battle of the War of the Roses, fought on Aug. 22, 1485, on a moor two miles south of the village of Bosworth. In this battle Richard III was defeated, and the victor, the Earl of Richmond, became King Henry VII. See Roses, War of the.

Botan'ical Gar'den, a park set apart for raising all kinds of plants for scientific study. Such gardens were probably first established for the purpose of raising medicinal or seasoning plants, and the earliest one was that of the Benedictine monks in Italy. Afterward, odd and unusual plants were collected in various

Italian cities, and in Paris a large garden was established whose object was to suggest color schemes for court dresses and to furnish court boutonnières. It still exists as the Jardin des Plantes, one of the most complete botanical and zoological gardens of the world. The earliest gardens for purely scientific study were those of Jena, Strassburg, Upsala and Göttingen. The Kew Gardens of England, established in 1795, are probably the largest and best known. In the United States the botanical gardens are connected with the universities and form continually growing laboratories for botanical study. The largest is that connected with Washington University, St. Louis, and formerly known as the Shaw Botanical Garden.

Bot'any, the study of plants. Because of the pleasing conditions under which this subject may be best studied and enjoyed, it is one of the most fascinating of sciences and one which opens the eyes to new worlds, though they are worlds that lie all about us. Botany is a science which has recently emancipated itself from its long imprisonment in textbook, classroom and laboratory and has wandered out into its natural haunts, the woods, meadows, parks and lawns. We are all students of botany to some extent, for there is none among us but recognizes the yellow dandelion, the bright-faced pansies, the flaming geraniums and the stately maples. But after all that is scarcely enough to rank us among scientific botanists, unless we can add to this a great desire to learn more. Many people who may be able to speak with certainty of the varieties of vegetation in the tropics would be surprised to know of the number of plants growing in their very yard, but which they have never seen. Try marking off a plot two yards square upon your lawn or in the park, and it is safe to say that within it you will be able to find at least a dozen plants whose names you do not know. Many of them will be minute, and many of them will wear familiar faces, but to the majority of people they will be nameless. For another experiment, try naming the trees that shade the walk or roadway one mile from the house in which you live. The maples, poplars and willows you, no doubt, recognize, but the others are less apt to be known. Again, sometimes a tree is familiarly known by its leaves in summer but becomes a stranger in winter when the leaves have fallen. Another can be known by its shape if seen from a distance, but if seen from close range, its bark tells nothing.

There are few people who do not enjoy speaking the name of the blossoms that grow by the roadside, the shrubs in the parks, the gay flowers in the florist's window or the wilder members of the woodland families; and the one who says he does not care to pick a flower to pieces does not realize that by closely examining one blossom he is able to learn the name and the characteristics of many. Until you have once begun looking at plants with keen desire to become acquainted with them you will not realize how great a pleasure is in store for you. A mere knowledge of names, though enjoyable in itself, is by no means the chief delight of botany, and there is a certain amount of assistance that we can get through our books after we have learned to see what nature has to show us. Any botany will supply the necessary information as to the parts of a plant and their uses, but otherwise than that the plant will tell its own story.

Classification. For the sake of convenience in classifying plants, certain terms have come into use which show the relationship of one to another. This system renders our knowledge less confused and more easily remembered than if it consisted of numerous unrelated facts. Plants which have descended from the same original stock are said to belong to the same *species;* if by accident of climate, soil or breeding one of these individuals presents noticeable differences, which, however, may not appear constantly in its descendants, that individual and its similar descendants are said to be a *variety* of the original species. The term *variety* is in frequent use among florists and horticulturists, but on

account of its lack of definiteness is being superseded by the term *subspecies* among the florists. Closely related species which have their most important parts constructed upon the same design are classed together in a *genus* (pl. genera). Genera are classed together as *orders* or *families,* when they resemble each other in several particulars. Many botanists use the terms *order* and *family* synonymously, but technically *order* is the higher term and refers to a group of related families. The orders are united into *classes* and the classes into *divisions.* These are the principal grades in the scale of classification, but many other subdivisions have been inserted and other names, such as cohort, series, subclass, tribe, etc., have been applied. The terms explained, however, are sufficient for the use of those who wish to classify the ordinary plants which have come under their observation. In the lower forms of plant life, as among bacteria, mosses and lichens, this system is not so exactly carried out as in the higher, and the names differ somewhat; there the names of the classes are ordinarily indicated by a series of suffixes universally used among scientists. See Study Guides.

The following outline gives the main divisions of the plant world, with a few of the leading families:

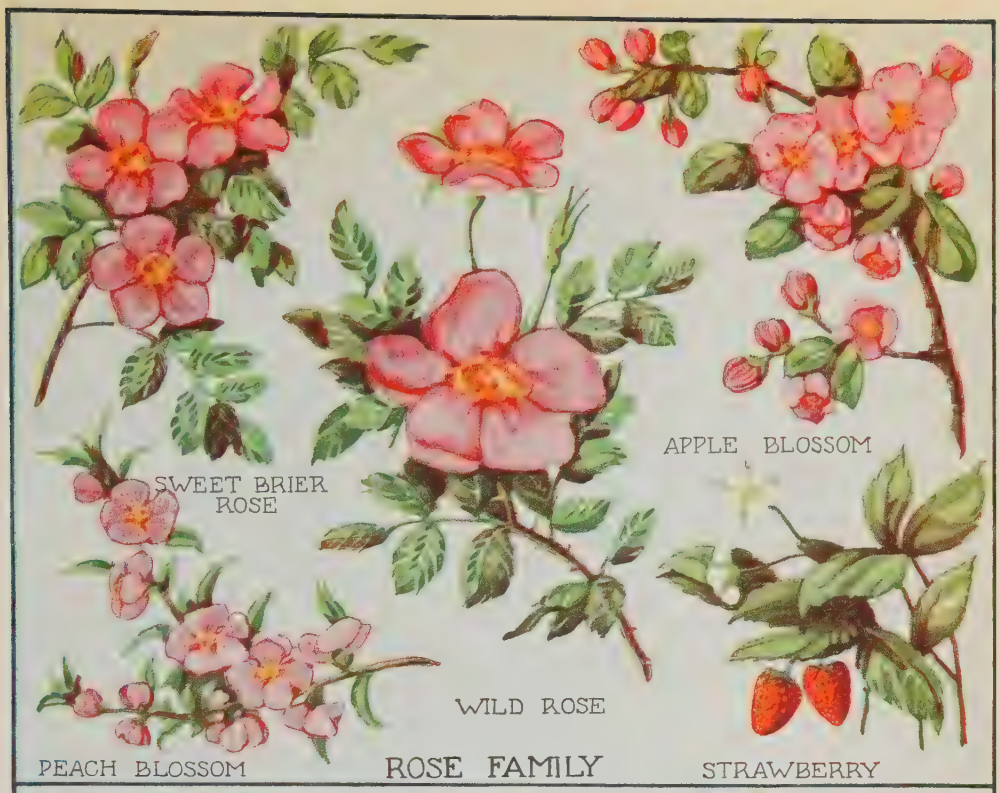
I. Flowerless Plants (Cryptogams)
  A. Leafless Plants (Thallophytes)
    1. Bacteria
    2. Fungi
    3. Algæ
    4. Lichens
  B. Moss Plants (Bryophytes)
    1. Liverworts
    2. Mosses
  C. Fern Plants (Pteridophytes)
    1. Ferns
    2. Horsetails
    3. Club Mosses

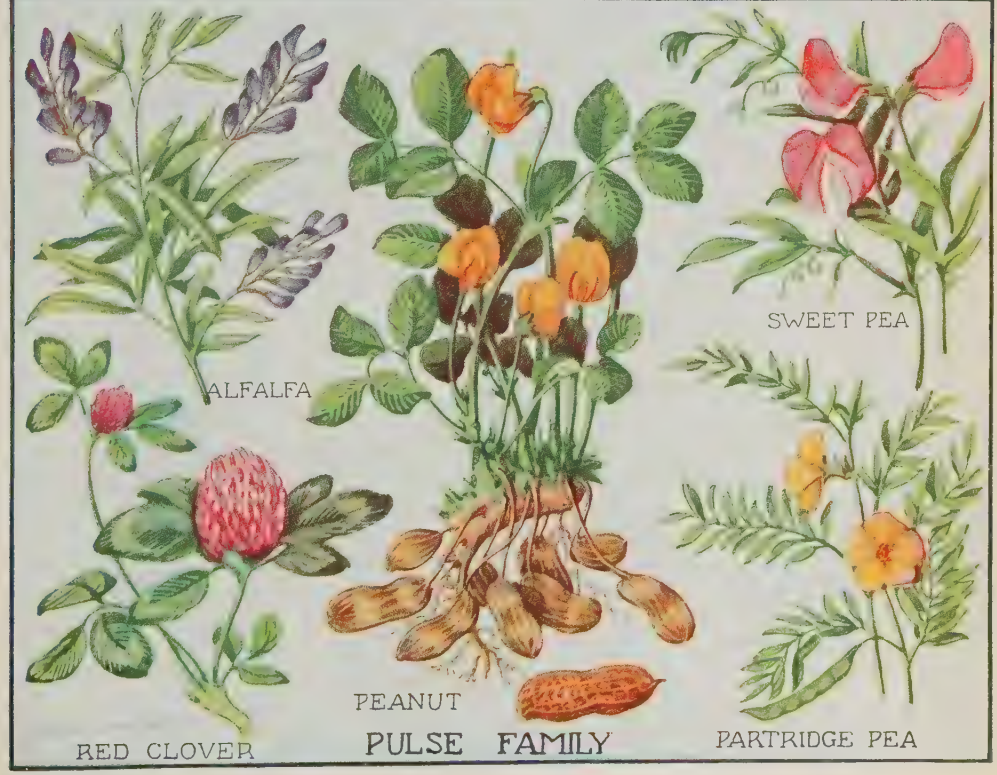
II. Flowering Plants (Phanerogams)
  A. Gymnosperms (Having unenclosed seeds)
    1. Cycad Family
    2. Pine Family
  B. Angiosperms (Having enclosed seeds)
    1. Monocotyledons (Having one seed-leaf)
      a. Lily Family
      b. Arum Family
      c. Iris Family, etc.
    2. Dicotyledons (Two seed-leaves)
      a. Crowfoot Family
      b. Magnolia Family
      c. Mustard Family
      d. Poppy Family
      e. Violet Family
      f. Rose Family
      g. Pulse Family
      h. Heath Family
      i. Milkweed Family
      j. Mint Family
      k. Composite Family, etc.

Bot'fly", a family of large or medium-sized insects of the order Diptera. Members of this family are extremely harmful, but cleverly conceal themselves from destruction by their resemblance to bees. A close examination, however, reveals fine wrinkles upon their wings, small mouths with only a rudimentary proboscis, broad heads and three-jointed antennæ, tipped with a tiny bristle, all of which bees do not have. There are several genera, all of which, in the larval stage, are parasitic upon Mammals. The horse botfly buzzes about horses and cattle, laying its eggs in the hair of the legs and shoulders. The larvæ, which are soon hatched, are licked off by the irritated host and are swallowed, continuing their life in its alimentary tract and causing the disease known as bots. When ready to pass to the pupal stage, they pass from the body and soon become adults. The sheep botfly lives in the nostrils of cattle, especially sheep, and causes the disease called the staggers. Another botfly, frequently called marble-fly, infests the hides of cattle and renders them valueless. See INSECTICIDE.

Both'nia, Gulf of, the part of the Baltic Sea lying north of the Island of Åland, with Sweden on its western and Finland on its eastern shore. It is 400 m. long and has an average breadth of 120 m., with a depth varying from 20 to 50 fathoms. The waters are slightly salt

PLANT FAMILIES





PLANT FAMILIES

and completely frozen over in winter. Its harbors are good but navigation is not free from dangers. The shores are rising, the estimated rise of the bottom being about five feet per century.

Both'well, James Hepburn (1537-1578), a Scottish nobleman of the uncertain times of Mary, Queen of Scots. He became Earl of Bothwell in 1556 and was one of the most powerful nobles of his day. After the accession of Mary he was made a privy councilor, but because of his irascible temper he was soon ordered to leave the capital city. Bothwell was involved in many conspiracies but escaped conviction in each case. He was indicted for the murder of Darnley, but the presence of 4000 of his followers at his trial gave him a speedy acquittal. Two months later, after carrying Mary secretly to Dunbar Castle, his marriage to her took place at Holyrood. Public opinion became so aroused that Mary was made a prisoner, and Bothwell, finding safety only in flight, collected a small navy in the Orkneys and became a pirate. Being pursued thither he escaped to Norway, where he was captured and taken to Denmark as a life prisoner. There, driven insane by his incarceration, he died, and his titles and estates were forfeited to the English crown. Swinburne's *Bothwell* presents a realistic picture of the man and his times.

Botticelli, *Bot"te chel' le,* **Sandro,** whose real name was Alessandro di Mariano de' Filipepi (about 1444-about 1510), was one of the most distinctively individual painters of the early Florentine Renaissance. He was apprenticed to Filippo Lippi, with whom he worked for about ten years. Among his earlier works are *Adoration of the Magi,* in the National Gallery, London; an allegorical figure called *Fortitude,* in the Uffizi Gallery; *Judith and Holofernes;* and the *Chigi Madonna,* in the private collection of Mrs. Jack Gardner at Boston. Botticelli early in his career came under the patronage of Lorenzo de' Medici, for whom the artist painted his most famous picture, *Primavera,* or *Spring,* now in the Academy at Florence. This picture, with its delicacy and lightness of touch, sprightly grace, rhythm of line and also its imperfect representation of the human form, reveal the artist's greatest charm and his most evident weakness, and also illustrates that a perfect drawing of form is not essential to the expression of beauty. Similarly fanciful and characteristic is the *Birth of Venus,* now in the Uffizi Gallery. Other equally famous works are *Mars and Venus,* the *Virgin with the Pomegranate* (Uffizi), *Pallas and the Centaur* (Pitti Palace), *Coronation of the Virgin* and *Adoration of the Magi.* The most important productions of this master, however, are the frescoes illustrating episodes in the life of Moses, in the Sistine Chapel of the Vatican.

Bot'tle, a vessel having a small neck with a mouth, into which fits a stopper or cork. They were made in ancient times to hold liquids, and were constructed of leather and of hides; however, glass bottles have been found in the ruins of Pompeii. A small glass bottle is called a vial, while a large one with a big mouth is termed a jar. The commercial bottle is made of glass and is of many sizes. Bottles are made by blowing molten glass in a mold, the blowing being done by workmen or by a machine. See GLASS.

Bottle Tree, a tropical tree of the Mallow Family, so named because of its peculiar trunk, which is so swollen as to resemble a flask or bottle. It is not a tall tree and is unbranched up to the "mouth" of the bottle. The leaves are long and narrow, with uncut margins and pointed apexes. The flowers, which grow in short clusters, have five petal-like sepals and many slender stamens. The fruit is a six-seeded pod. The stems are said to contain a great amount of water and are useful in times of drought. The bottle tree is a native of Australia.

Boulanger, *Boo" lahn zha',* **Gustave Rodolphe** (1824-1888), a French figure painter of the Classical and Oriental schools. His paintings show imagination and skill, but are somewhat lifeless. His best-known works are *Moor-*

ish Cafe, Cæsar at the Rubicon, The Slave Market and the panels in the New Opera, Paris. He was elected a member of the Institute in 1882.

Boulder, *Bole' der,* **Colo.,** a city and the county seat of Boulder Co., 28 m. n.w. of Denver, on the Union Pacific, the Colorado & Southern and other railroads; the Colorado & North Western Railway connects it with mining camps in the vicinity; the Denver & Interurban provides hourly service to and from Denver. The city is beautifully situated 5360 ft. above sea level at the base of the foothills of the Rockies, with the wide plain extending eastward as far as the eye can see. From the lofty continental divide close at hand on the west, Middle Boulder Creek, a tributary of the St. Vrain River, flows down through the city. The region is rich in deposits of gold, silver and other minerals; and in the vicinity of Boulder are several famous mines. Oil and natural gas are among other natural resources, and there are medicinal springs near by. Most of the tungsten mined in the United States comes from this locality. The surrounding country, except to the west, has been made agriculturally productive through irrigation, and farming and stock raising are extensively engaged in. The principal industries formerly were connected with the mines, but the city is now noted as a residence community. There are, however, sampling works, flour and lumber mills, brickmaking plants and oil refineries. The city water supply is derived from lakes at the foot of Arapahoe Peak Glacier. The climate of Boulder is delightful and is particularly beneficial to those afflicted with pulmonary and bronchial troubles.

Boulder is the seat of the state university, opened in 1877, and near the city are held the sessions of the Colorado Chautauqua. A natural mountain park of 2840 acres and a public library are among the attractions. There are three beautiful canyons in the immediate vicinity of the city. The first settlement near the site of Boulder was made in 1858. In the following year gold was discovered and the town was laid out. The place is administered under a revised charter of 1882. Population in 1920, U. S. Census, 11,006.

Boun'ty, in a military sense a sum of money offered in addition to the regular wage, to induce men to enlist in the army; or prize money paid officers and men in the navy for destroying or capturing a ship of the enemy. During the Civil War as much as $1000 per man was offered for the purpose of inducing men to enlist. This led to the fraud known as bounty jumping, or enlisting and deserting after receiving the bounty.

The officers and crew of battleships in the United States navy receive a bounty for capturing or destroying an enemy's ship. If the force of the enemy's ship is superior to that of the force destroying her, the bounty is $200 for every man of the force destroyed. If the destroying force is superior, the bounty is $100 for every man of the force destroyed. If the enemy's ship is not destroyed during the engagement, but is captured and destroyed afterwards, the bounty is $50 per man on board the vessel at the time of capture.

Bourbon, *Boor' bun,* the name of a family from which many European kings have sprung. The first member known in history was Adhémar, who was Baron of the Bourbonnais about the ninth century. By marriage with Robert, sixth son of Louis IX, the Bourbon family became connected with the royal line of France. In 1548 Antoine de Bourbon married Jeanne d'Alhet and became King of Navarre. Their son became Henry IV of France. Louis XIII, the son of Henry IV, left two sons, Louis XIV and Philip, Duke of Orleans. Louis XIV was succeeded by his great-grandson, Louis XV, and the son of Philip of Orleans was regent during the minority of Louis XV. A grandson of Louis XIV became Philip V of Spain and was the founder of the present royal family of that country. Louis XV was succeeded by his grandson, Louis XVI, who died in the Revolution. His son was called Louis XVII, but he never

reigned. After the Napoleonic era the two brothers of Louis XVI reigned as Louis XVIII and Charles X. Philippe Engalité, who died in the Revolution, was the grandson of the Regent in the minority of Louis XV. The son of Engalité reigned as Louis Philippe, King of France, from 1830 to 1848. His grandson and great-grandson have been called Philip VII and Philip VIII by their adherents.

Bourinot, *Boor"i no',* **Sir John George** (1837-1902), a Canadian historian, clerk of the Canadian House of Commons for many years. He was a Parliamentary reporter for several Canadian papers, and in 1860 he established the *Halifax Reporter,* of which he remained the editor for many years. His books and magazine articles established his reputation as an authority upon Canadian constitutional history and parliamentary practice. His best-known works are: *Canada* (in *Story of the Nation* series); *Parliamentary Procedure and Government in Canada; How Canada is Governed; Cape Breton and Its Memorials of the French Régime.*

Bow. See Arrow.

Bowdoin, *Bo' den,* **College,** at Brunswick, Me. (1794). This is the oldest institution of higher learning in Maine. It is nonsectarian. It was named for James Bowdoin, one of the early governors of Massachusetts, of which Maine was a district, and was largely endowed by his son. It was opened in 1802 and in 1820 added a school of medicine. Its list of alumni includes the names of Longfellow, Hawthorne, Franklin Pierce, Chief Justice Melville W. Fuller, William P. Frye, Gen. O. O. Howard and Thomas B. Reed. Women are not admitted. The state has granted the college some financial aid. Its library includes about 120,000 volumes. Its endowment exceeds $2,600,000. There are about 450 students.

Bowell, Sir Mackenzie (1823-1917), a Canadian statesman, born in England. At the age of ten he removed to Canada, where he was educated. He later became editor and proprietor of the Belleville *Intelligencer.* He has held various public offices, serving in the Dominion Parliament from 1867 to 1892, as minister of militia and defense in 1892 and as premier from 1894 to 1896. In the latter year he became leader of the Conservatives in the Senate.

Bow'er Bird, a group of birds related to the Bird of Paradise Family. They are about the size of a robin. The larger number of species, of which upwards of 15 are known, live in eastern Australia and the Papuan Islands. The name was bestowed upon these birds on account of the habit of the male of constructing a walk, or bower, by bending or arching small sticks or stiff grass. These bowers are made and used only by the males, and in them they perform certain antics to attract the attention of the females. These bowers may be three feet in length and eight inches in width. Inside and outside the bower the birds deposit various kinds of objects, each species seeming to prefer a certain sort of material, as the snail shells used by the regent bower bird, bird feathers used by the satin bower bird, and the shells, bones, pebbles and other objects used by the spotted bower bird. The latter is from 10 to 12 inches in length and is mottled with brown all over, with a rose-pink or lilac band across the back of the neck. The nest is saucer-shaped, made of twigs and lined with grass. It is placed in a thick pine or other tree. Two or three eggs, streaked brown and black, on a yellowish-green background, are laid. These birds live in dry, well-timbered localities.

Bowling, *Bo' ling,* a form of indoor exercise which is extremely popular during the cooler months. It is now a recognized sport; but is especially valuable for those engaged in sedentary occupations, and has been adapted to the needs of all, including women and children. It affords numerous recreative games, all of which are played on platforms called *alleys.* These are almost perfect planes 41 inches wide, built of maple strips set on edge, and measure 60 ft. from the space occupied by the pins to that al-

lowed for the contestants. As it is most commonly played, ten pins are used, these being 15 inches high, with a maximum circumference of 11⅝ inches and 2¼ inches in diameter at the bottom. They are set in the form of an equilateral triangle on spots 12 inches apart from center to center, and face the players in rows of 1, 2, 3 and 4. Small, light balls may be used, and these are required in certain games, for which there are also lighter pins. However, even in ten pins, balls may not be more than 27 inches in circumference, or weigh more than 16½ lb. Any number of players may use a given alley. Each, in turn, bowls a *frame* until all have bowled ten. If, in the first frame, one should knock down all the pins with the first ball rolled, he would score a *strike,* and would ultimately count, for that frame, 10 plus whatever he made with his next two balls. By making a strike in the tenth frame, he is entitled to two more balls. Twelve balls rolled, therefore, if each makes a strike, will give a perfect score, or 300.

In any frame in which he does not make a *strike,* the player is entitled to roll a second ball against the pins which remain standing. If, with two balls, he gets less than 10, he scores only the number knocked down, as 4, 7 or 9. If his second ball clears the alley, he has made a *spare;* and for this frame will count 10, plus whatever he makes with the next ball. A swinging cushion behind the alley stops the balls, which are then picked from the shallow pit in which they come to rest and returned by an attendant along an inclined trough, to the bowlers.

Bowling, *Bo′ling,* **Green, Ky.,** a city and the county seat of Warren Co., 114 m. s.w. of Louisville, on the Barren River, at the head of navigation, and on the Louisville & Nashville and other railroads. It lies in a fertile agricultural region, in which are produced large crops of corn, wheat, oats, hay, tobacco and vegetables. The city is one of the most important horse markets in the state, and there is also a considerable trade in cattle, mules and hogs. The leading educational institutions are Ogden College (opened in 1877) and Potter College for Women (1889), both nonsectarian; Southern Normal School and Business College; and St. Columba's Academy. There are two public parks. Bowling Green was incorporated in 1812 and its present charter dates from 1893. During the Civil War the city was one of the strategic points of the Confederates. Population in 1920, U. S. Census, 9,638.

Box, a poisonous, evergreen shrub of the Spurge Family, used frequently for hedges or ornamental shrubbery, since it can be made to retain any shape given it by pruning. The tree-box and dwarf-box, the latter of which is a variety of the first, having smaller leaves and a shorter trunk, are both natives of the Mediterranean regions. The leaves of both species are thick and have smooth margins. The flowers grow in thick clusters in the joints of the leafstalk and the main stem. In our grandfathers' gardens the box was trimmed into fantastic shapes—animals, decanters, buildings and furniture being represented. At present, however, box is rare in this country and, in consequence, is rather valuable. Boxwood is fine-grained and hard, and susceptible to a high polish, making it particularly fitted for use in wood engraving. Its color is white or light yellow, and from it snuffboxes, inlaid jewel cases and other ornamental boxes are made. It is also used in making rulers, musical instruments, handles of tools, etc., for the wood is among the heaviest known. The leaves are used medicinally.

Box El′der, or **Ash-Leaved Maple,** a handsome, though not large, ornamental tree of the Maple Family. The trunk is apt to be somewhat stocky, branching not far from the ground, and covered by a dark or brownish bark, which seems wrinkled rather than furrowed; in shape the trunk generally has irregularities which keep it from being cylindrical. The leaves differ from those of most maples in being made up of three or more leaflets, which are irregularly lobed and often maplelike in form. The flow-

ers are small, yellowish-green in color and appear before the leaves in the spring. The fruit is the familiar cluster of drooping, winged pods, common to the maples. Box elder grows abundantly from the Rockies to the Atlantic Ocean both in Canada and the United States. The soft, close-grained wood is used for interior decoration and in the manufacture of pulp for paper and woodenware. It is used as an ornamental tree on account of its spreading form, dense shade and rapid growth.

Box'ing, a hand-to-hand contest between two persons wearing padded gloves, in which, under rules that insure fairness, they often display astonishing skill in the art of self-defense without weapons. Boxing is the art of hitting without being hit, and is an American and British sport; while jiujitsu, a method of defense perhaps no less effective, has been developed by the Japanese. Throughout the world the Queensberry rules govern in all boxing contests. Individuals are classified as being not over a certain weight, and are expected to compete only with those of their own class. These classes are: *bantam* weight, 105 lb.; *feather,* 115; *light,* 135; *welter,* 145; *middle,* 158, and *heavy,* over 158 lb. Contests are held in a space 16 by 24 ft., called the *ring.* This is surrounded by two ropes which make a fence four feet high. Contests between *professionals* are commonly treated under pugilism. These have fallen into disrepute, because, too often, they have ceased to be merely exhibitions of boxing, and become prize fights, which are now illegal in England and in many American cities and states. This has operated to lessen interest in boxing between amateurs; and in some places even such contests are now illegal if an admission fee is charged. Boxing, however, when properly conducted, is one of the best forms of physical exercise, developing agility, keenness of vision, self-control and a good bearing, while strengthening the lungs, heart, back and limbs.

Boy'esen, Hjalmar Hjorth (1848-1895), a Norwegian-American novelist and educator, born in Frederiksvärn, Norway. He came to America in 1869, edited a Scandinavian journal in Chicago, was professor of German at Cornell University, and professor at Columbia University from 1880 until his death. After six years in America he wrote English prose and verse with facility; his other writings were in German and Norwegian. They include *Gunnar: A Norse Romance, Tales from Two Hemispheres, Ilka on the Hilltop, Alpine Roses, Social Strugglers, Literary and Social Silhouettes, Essays on Scandinavian Literature* and *Essays on German Literature.*

Boyle's Law. See GASES, LAWS OF.

Boys and Girls Clubs, organizations established upon the advice and under the direction of the United States Department of Agriculture for the purpose of stimulating an interest in agriculture as a vocation. Such clubs are instituted by rural teachers and county school superintendents and usually are composed entirely of boys and girls of the rural schools. The officers are chosen from among the children, subject, of course, to oversight and direction by the teacher. The activities of the clubs consist mainly of contests in growing corn, potatoes or similar crops and in judging seed, animals, etc. The Boys' Corn Clubs are probably the most popular of these and wield the widest influence. The object of all such clubs, as stated by the United States Department of Agriculture bulletins, is: "to afford the rural teacher a simple and easy means of teaching elementary, practical agriculture; to prove that there is more in the soil than the farmer has as yet gotten out of it; to give young people a love for the land and its care and to interest boys and girls in one of the greatest of industries, which, through lack of scientific study, had begun to fall into disrepute."

Boy Scouts of America, an organization for the training of boys between the ages of 12 and 18 years. The purpose is to develop self-reliance, manhood and good citizenship. The movement was

started in England by General Sir Baden-Powell in 1908. Two organizations started in America at about the same time, one under the direction of Daniel C. Beard and the other under the direction of Ernest Thompson Seton. These organizations combined and formed the Boy Scouts of America. Since its organization the movement has spread rapidly. Within three years it attained a national scope. The governing body is a national council, which, through an executive board, is given full power to direct the movement. This council includes some of the most eminent men of the nation. William H. Taft was made honorary president and Theodore Roosevelt honorary vice-president.

Scout-craft, which is the key word to the method of training, includes instruction in first-aid life saving, tracking, signaling, cycling, nature study, seamanship and other lines of usefulness. Instruction is given through games and by team work and is a pleasure to the boys. On joining the organization a boy is required to take the following oath: "On my honor I promise that I will do my best (1) to do my duty to God and my country; (2) to help other people at all times; (3) to obey the scout law." Each local organization is under the direction of a scout master, who has received special preparation for his work.

Bozeman, *Boze′ man,* **Mont.,** a city and the county seat of Gallatin Co., 98 m. s.e. of Helena, on the Gallatin River and on the Northern Pacific and other railroads. A canal for both irrigation and navigation has been constructed here. Bozeman is in a region rich in mineral resources, coal, iron, onyx, gold and silver being the chief minerals. In the near vicinity of the town are valuable quarries of building stone. The agricultural and stock-raising interests are important. There are seed pea plants, flour mills, elevators, a cannery, lumber mills and a foundry. At Bozeman is located the Montana State College of Agriculture and Mechanic Arts, opened in 1893. Population in 1920, 6,584.

Bozzaris, *Bo zar′ is,* **Marco,** *Mahr′-ko,* (about 1790-1823), a Grecian patriot, born at Suli, in the mountains of Epirus. In 1821 he became an active participant in the Greek struggle for liberation and won many victories against the Turks. In 1823, anticipating a Turkish assault on the fortifications of Missolonghi, he led a night attack on the enemy's army at Karpenisi. The Turks, though greatly outnumbering the Greeks, were thrown into utter confusion and completely routed. The heroic Bozzaris, who fell during the engagement, has been made the subject of a stirring poem by the American poet Fitz-Greene Halleck.

Brack′en. See BRAKE.

Brad′dock, Edward (1695-1755), a British soldier. In 1754 he was placed in command of all the English troops in America, having then served ably, for 40 years, in the British army. He reached Hampton, Va., early in 1755 and, near Alexandria, soon met the Virginians who were to make the attack on Ft. Duquesne. He was joined by Benjamin Franklin and by Washington, whom he asked to attend him as aid-de-camp. In another month Braddock reached Ft. Cumberland, over the route which Washington, two years previous, had marked out. His army included regulars, provincials and a few Indians, and they had advanced in close formation as though on an open plain; for Braddock scornfully ignored all suggestions regarding the danger of Indian attacks from ambush.

On July 9, 1755, an advance corps of picked men, under Gates, had progressed to within about five miles of Duquesne when they were suddenly attacked by a band of some 800 Canadians and Indians. The British fell back, frightened and demoralized by the warwhoop which they had never before heard. On hearing the fighting, Braddock pushed rapidly on to aid Gage and he tried to rally the men against their hidden enemy. But he ignored Washington's protests and kept his troops drawn up in platoons. They fired aimlessly into the forests and were themselves rapidly mowed

down. The Virginians, however, had separated early in the conflict and were hidden by rocks and trees. Throughout the attack Braddock showed admirable bravery. Four horses were killed under him and, while on a fifth, he was mortally wounded. He died before reaching civilization and was buried in a roadway. With the fall of Braddock the battle became a rout. Less than one-third of the 1500 men escaped. These were led to safety at Dunbar's Camp by Washington. The losses of the enemy were insignificant.

Braddock, Pa., a city of Allegheny Co., 10 m. e. of Pittsburgh, on the Monongahela River and on the Pennsylvania, the Baltimore & Ohio and the Pittsburgh & Lake Erie railroads. It has one of the largest steel plants in the country, whose product is essentially steel rails. The town has also extensive manufactories of pig iron, wire, cement, plaster and other articles relating largely to railroading and car construction. Here General Braddock was defeated and killed by the French and Indians in 1755. The city was incorporated in 1867. Population in 1920, U. S. Census, 20,879.

Bradford, a city in West Riding, Yorkshire, England, situated on a tributary of the River Aire, 8 m. w. of Leeds. The principal buildings include the concert hall (Saint George's Hall), the Church of St. Peter, the town hall, the Exchange and Piece Hall. The public school system is excellent and a technical school, public circulating libraries and an art museum are maintained. In all respects it is a modern municipality, owning and controlling its waterworks, gas works, etc. Bradford represents the center of the spinning and weaving of worsted yarn in England, and also manufactures cotton, velvet, plush and silk. It returns three members to Parliament and has been a Parliamentary borough since 1832. The inhabitants of the city took sides with Parliament during the Civil War; in 1643 they were compelled to surrender to the Earl of Newcastle. The first temperance society in England was organized in Bradford. Population, about 287,000.

Bradford, Pa., a city of McKean Co., 67 m. s. of Buffalo and 15 m. n.w. of Smethport, on the Buffalo, Rochester & Pittsburgh, the Erie, the Pennsylvania and several local railroads. Bradford is the headquarters of extensive manufactories of refined oil, oil-well tools, tanks, air compressors, gas engines, glass, terra cotta, cutlery and motor cycles. It was settled in 1823 and chartered as a city in 1879. Population in 1920, 15,595.

Bradford, William (about 1588-1657), colonial statesman and governor, born in Yorkshire, England. He went with other Puritans to Holland to escape religious persecution, and came to America in the *Mayflower* in 1620. Upon the death of Carver in 1621 he became the second governor of Plymouth Colony. This office he held until his death, except during five years when he declined to serve. During this long incumbency of 31 years he managed the affairs of the colony with remarkable ability and wisdom, being especially sagacious in his dealings with the Indians. He left a number of writings, the most important of which was his *History of Plymouth Plantation,* covering the history of the society from its inception in 1602 through its early struggles in Plymouth to the year 1647. This work has become the authority for all later histories of the period.

Brad'street", Anne (about 1612-1672), an American poet, born in Northampton, England. She was the wife of Governor Bradstreet and removed with him to New England in 1630. Her poetry was unduly praised by her contemporaries, and the only interest that now is attached to her name is the fact that she was one of the earliest American poets. On the title page of her book, *Several Poems Compiled with Great Variety of Wit and Learning,* etc., she is referred to as "the Tenth Muse."

Bradstreet, Simon (1603-1697), a colonial governor of Massachusetts, born in Horbling, Lincolnshire, England. He was educated at Cambridge. In 1630 he came to America and settled at Cam-

bridge, Mass. After having held many positions of trust, in 1662 he went to England for the colony to congratulate Charles II on his restoration. From 1630 to 1679 he was assistant governor; from 1679 to 1686 and from 1689 to 1692 he was governor of the colony. In 1692 he became first councilor. He was conspicuous in the witchcraft delusion of that year (See WITCHCRAFT). He was the husband of Anne Bradstreet, the poet.

Bra'dy, Cyrus Townsend (1861-1920), an American clergyman and author, born in Allegheny, Pa. He graduated from the United States Naval Academy, but did not enter the naval service. After spending some time in railroading, he studied theology and was ordained to the Episcopal ministry. He was made Archdeacon of Kansas and, later, of Pennsylvania, and was chaplain in the Spanish-American War. He is a member of the American Academy of Political and Social Science. Brady has written *Recollections of a Missionary in the Great West,* lives of John Paul Jones and Stephen Decatur, and a number of popular stories, among which are *Hohenzollern* and *The Southerners.* His stories usually have a historical setting.

Braga, *Brah' gah,* **Theophilo** (1843-), a Portuguese poet, scholar and public man, first president of the provisional Republic of Portugal, born on the Island of São Miguel, where he received his early schooling. In 1861 he began to study law at Coimbra, writing poetry while pursuing his legal studies, and publishing, in 1864, an epic entitled *Vision of the Ages,* which had immediate success. He received the degree of doctor of laws in 1868 and in 1872 won, by competition, the chair of modern languages in the Curso Superior de Lettras in Lisbon. His *History of Portuguese Literature,* 32 volumes of which have been published, was now begun, and was followed by numerous works on philosophy, sociology and politics. Entering actively into politics, he became editor of a Republican paper and leader of the Republican Party in Portugal. When the monarchy was overthrown and a republic declared, October, 1910, Dr. Braga was made president, being succeeded in 1911 by Manoel de Arriaga. See PORTUGAL, subhead *History.*

Bragg, Braxton (1817-1876), an American soldier, born in North Carolina and educated at West Point. Entering the artillery, he served in the Seminole War and in the war with Mexico, being brevetted lieutenant-colonel for his services at Buena Vista, February, 1847. He became a major in 1855, resigned the following year and was an extensive planter in Louisiana till the opening of the Civil War, when he was made a brigadier-general in the Confederate army and given command at Pensacola, Fla. In April, 1862, as major-general, he had a prominent command at Shiloh, was soon afterwards made general in place of A. S. Johnston, who was killed, and in May succeeded Beauregard in command of the army in the West. He met defeat at Perryville and at Murfreesboro, had success at Chickamauga, but was defeated by Grant at Chattanooga, after which he was soon relieved of command at his own request. Subsequently he was military adviser to President Davis at Richmond and failed in an attempt against General Sherman in Georgia. Following the war he was for a time chief engineer of Alabama and superintended improvements in Mobile Bay.

Brahe, *Brah,* **Tycho,** *Ti' ko,* (1546-1601), a Danish astronomer, born at Knudstrup, in Scania, then a Danish province. At the age of 14 years, while studying at the University of Copenhagen, he became greatly interested in astronomy by the occurrence of an eclipse of the sun at exactly the time predicted by astronomers. At Leipsic in 1562, studying law under a tutor, he read astronomy while his tutor slept. In 1565 he inherited a fortune that enabled him to pursue his favorite studies. In 1572 he was greatly inspired by the new star, Pilgrim, that blazed forth in Cassiopeia. In 1576 Frederick II of Denmark gave him the Island of Hveen and sup-

plied the means for the building and equipment of an observatory there which he called Uraniborg. Here Brahe worked for over 20 years. Upon the death of Frederick he was forced to leave Uraniborg and finally settled in Prague under the patronage of Rudolph II. Brahe published numerous works, vastly improved the art of astronomical observation and constructed a table of refractions.

Brah'manism, the name given to that social and religious system of India which was developed by the Brahmans. The Hindu scriptures consist of collections of sacred texts, called the Vedas, supplemented by prose writings called Brahmanas, which explain the meaning and ritual application of the Vedas. The Vedas are regarded by the Brahmans as sacred revelations. See VEDAS.

The Brahmans constitute the highest caste in India. They became at a very early date the priests and the custodians of the Vedas, adding the later writings mentioned above and giving form to the religion that finally took their name. They formulated rules which defined their caste and enforced these rules by penalties of the severest kind. The Brahman passes through four stages in his advance toward his highest attainments. In the first stage, as a novice, he begins his study of the Vedas, is initiated into the privileges and duties of his caste, is exempt from punishment and has a right to alms. In the second stage he marries, and when he has trained his son and a son is born to this son, he is supposed to enter the third stage. In the third stage he enters the forest as a recluse, inflicting severe penance upon himself for the purification of his soul. In the fourth stage he increases his solitude, meditating upon the ultimate good until his soul is refined away into Brahma. Very few ever go further than the second stage.

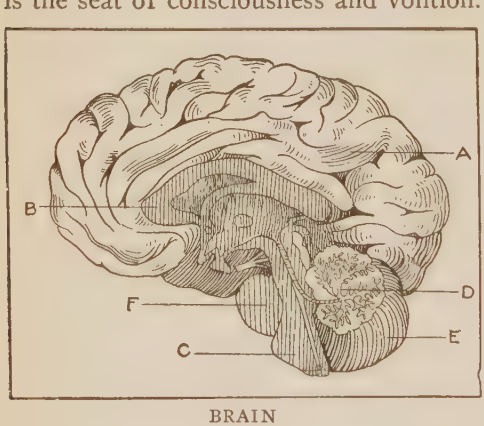
Brahma is a Sanskrit word used in both the neuter and the masculine genders. In its neuter form it refers to the great, universal, impersonal power, or essence, of the universe, of which the human soul is a part and into which it is finally merged. In the masculine form the word names this universal essence personified, and the impersonal essence of the universe becomes Supreme Personal Creator of the universe. In this character he is the first person in the Hindu Triad, which consists of Brahma, the Creator, whose color is red and who rides upon a swan; Vishnu, the Preserver of mankind, whose color is black and who compasses the earth in three strides, or rides upon a creature half man and half bird; and Siva, the Destroyer and Reproducer, who is often worshiped with indecent rites. This triad of gods developed from a maze of earlier gods and has itself been subject to great modifications through many generations. The general tendency of the higher castes, including the great philosophers of India, has always been toward monotheism, the belief in one great ultimate deity. This monotheism has usually associated the deity so closely with the material universe as practically to identify him with it, thus developing the great pantheistic idea that all is God. Brahmanism among the lower castes, however, is characterized by the belief in many gods, known as polytheism, the idea of the one god, Brahma, being too abstract for the unlearned minds of the lower castes.

Brahmaputra, *Brah"ma poo' tra,* a river of Asia, rising on the table-land of Tibet. It flows east and traverses the Himalayas, crosses the lowland plains of Assam and joins the Ganges River about 90 m. above its mouth. Together the two streams, with their wide delta, cut up the land diversely, and a network of inland navigation is formed. It is about 1800 m. long, and of this extent about 800 m. are navigable. In the first part of its course it is known as the Sanpo; later, as the Dihong; after the two streams, the Dibong and the Lohit, join it, it is called the Brahmaputra.

Brahms, Johannes (1833-1897), a celebrated German musical composer, born at Hamburg. He received his first lessons from his father, a distinguished

double-bass player, afterwards studying with Edward Marxsen. At first he played in concert and composed a few small pieces; and he was almost from the start recognized as a genius by the greatest musicians of his time, Joachim, Liszt and Schumann, the last of whom hailed him as the great musical "genius of the future." In 1854 Brahms was appointed choir-director and music master to the Prince Lippe-Detwold, and in 1863 director of the Singakademie of Vienna. His reputation was firmly established in 1868 when his *German Requiem* was produced at Bremen. In 1878 he settled in Vienna, and, withdrawing from society, devoted himself to composition. He wrote nearly 200 songs, of which *How Art Thou My Queen?* is the best known, and numerous orchestral works, the *Fourth Symphony* being considered the greatest.

Brain, the center of the nervous system. In man and the higher animals it is the seat of consciousness and volition.



BRAIN

The human brain is larger, both in proportion and in mass, than that of any other animal save the elephant and some whales. It consists of five principal parts: the cerebrum, the cerebellum, the mid-brain, the pons Varolii and the medulla oblongata. In the illustration A is the cerebrum; B, the corpus callosum; C, the medulla oblongata; D, the arbor-vitæ; E, the cerebellum; and F, the pons Varolii.

The Cerebrum. The cerebrum constitutes seven-eighths of the mass of the entire brain. It is divided by a deep fissure into two halves, or hemispheres, a right and a left, and by smaller fissures into five lobes. It occupies the upper part of the cranial cavity, to which its shape conforms. The two hemispheres are united at the lower end of the dividing fissure by a broad band of fibers, called the corpus collosum. The cerebrum is covered with a layer of gray matter made up of millions of nerve cells, and known as the cerebral cortex. The amount of this gray matter is in direct relation to the mental development. In the lower animals the surface area of the cortex is comparatively small; in man the cortical layer, in order to accommodate itself to its limited space, is folded and wrinkled into numerous elevations and depressions, known as convolutions. The higher the order of intelligence the more numerous the convolutions.

The cerebrum is responsible for all the higher intellectual faculties, and its various functions are localized in the cerebral cortex. Thus the area from which arises the conscious appreciation of sound is in the front upper part of the temporal lobe; that for vision in the occipital lobe in the back part of the head; that for movement, muscular memories, etc., near the middle of the median fissure. The frontal lobes are supposed to be connected with the higher mental activities. Millions of nerve fibers pass from the cells of the cerebral cortex and unite to form the cerebral peduncles, which pass into the mid-brain beneath.

The Cerebellum. The cerebellum, or "little brain," is situated below the posterior lobes of the cerebrum and behind the mid-brain. It measures from three and a half to four inches across and two inches from front to back. It is attached to the remainder of the brain by a complex arrangement of nerve fibers. Its functions have not been fully determined, but we know that it is concerned with coordinating the muscles and balancing the body.

The Mid-Brain. The mid-brain is a collection of nerve fibers serving to con-

nect the cerebrum with the pons, cerebellum and medulla. The medulla oblongata is the terminal enlargement of the spinal cord. It is about an inch long, and is continuous with the mid-brain above. Encircling the mid-brain just above the medulla and connecting with the cerebellum is the pons Varolii.

MEMBRANES. Lining the cavity in which the brain lies is a tough, thick membrane called the dura mater. Another membrane, fine and weblike, known as the pia mater, covers the brain and is interspersed with blood vessels. Both these membranes are invested with a delicate tissue called the arachnoid. Between the two arachnoid coats flows the cerebrospinal fluid. See NERVOUS SYSTEM.

Brain'erd, Minn., a city and the county seat of Crow Wing Co., 115 m. w. of Duluth and 136 m. n.w. of St. Paul, on the Mississippi River and on the Northern Pacific, the Minnesota & International and other railroads. By means of a dam across the river at this point an abundance of water power is obtained for manufacturing purposes. The city has extensive lumber interests and contains saw and lumber mills. In connection with other activities are operated cigar factories, flour mills, a large foundry, paper and pulp mills, a grain elevator and machine shops. The town has a considerable export trade in furs, lumber and grain. Brainerd has a public library, a courthouse, a Y.M.C.A. Building, a hospital conducted by the Sisters of St. Joseph, a public park and an athletic field. Settled in 1870, the place was named in honor of David Brainerd; it was chartered in 1883. Population in 1920, U. S. Census, 9,591.

Brain'tree, Mass., a town of Norfolk Co., which includes the villages of East and South Braintree, 10 m. s. of Boston, on the New York, New Haven & Hartford Railroad. Electric railways connect with all the neighboring towns and villages. It has extensive granite quarries and metal foundries and manufactories of absorbent linen, carpets, filters, leather, engines, nails, tacks, electrical machinery, shoes, rubber goods, fans and other articles. Until 1792 Braintree included what is now Quincy, which was the birthplace of John Hancock, John Adams and John Quincy Adams. Braintree was settled about 1629 and incorporated in 1640. Population in 1920, 10,580.

Brake, or **Brack'en,** a widely-known member of the Fern Family most noticeable in the autumn and winter, when its brown leaves, touched by the frost, stand as erect as in the earliest days of spring. The plant is found thickly covering waste meadows, uncultivated lands and half-cleared woodlands. The true stem of the brake is underground and is a thickened rootstock, from the base of which roots are produced and from the cap, leaf stems. These leaf stems are brown and tough, extremely difficult to break when young, and always erect. In a meadow or wood they generally grow about the same height, and as their fronds spread almost horizontally they make a leafy covering nearly two feet above the ground. The stem divides at its summit into three branches which bear stalks of tiny leaflets. The stalks are arranged in pairs on the main branch with one terminal stalk, making a featherlike arrangement. Each stalk is a minature of the main branch, bearing, however, the little, lobed leaflets instead of other branches. Ferns reproduce by spores rather than by seeds, and the spores are borne in tiny cases under the folded margins of the leaves upon the lower side.

The brake is a coarse fern, commonly spreading its fronds two feet across; in British Columbia leaves seven feet in width are found and in South America they are frequently twice as wide. In some places brakes are of use as bedding for cattle, and the rootstocks, ground, are used in preparing a coarse bread. The brake is probably the English "fearn."

Bram'ble, a name applied to any thorny, spreading shrub but especially to those like the blackberries, dewberries and raspberries, of the Rose Family. These latter have slender, drooping or prostrate stems closely set with sharp, spiny prickles. The leaves are made up

of from three to five hairy leaflets, oval in shape, sharp-pointed and saw-toothed. The flowers have a spreading, five-divided calyx and five white or pink, blunt-topped petals surrounding many stamens, which are arranged on the edge of the calyx cup. The fruit is made up of many pulpy cells united into a caplike, juicy berry which ripens in July and August. These berries are edible and may be red or black in color. Brambles are often cultivated for their fruit. In England the bramble is a lawn shrub cultivated more for ornament than for its berries. It is there commonly called blackberry and is a more refined plant than our shrubby garden bramble.

Brandeis, *Bran'dise,* **Louis Dembitz** 1856-), an American lawyer, sociologist and publicist, born in Kentucky but located in Boston since 1879. He is a graduate of the Louisville public schools, the Annen Realschule of Dresden and of Harvard University. He sprang into prominence as an attorney during the Pinchot-Ballinger investigation and as counsel for the people in proceedings to test the constitutionality of the women's ten-hour laws in Oregon and Illinois. Mr. Brandeis was appointed associate justice of the Supreme Court of the United States in 1916.

Bran'denburg, the province of Prussia in which the city of Berlin is located. It is bounded on the n. by Mecklenburg and Pomerania, on the e. by Posen, on the s. by Silesia and Saxony and on the w. by Saxony and Hanover. These are almost the same boundaries as those of the ancient Electorate of Brandenburg, for which the province was named when it became a part of Prussia in 1815. The rivers Elbe and Oder flow through Brandenburg, and in their valleys the soil is fertile; barley, rye, hemp, flax, hops, tobacco and fruits are raised in abundance. Elsewhere there are unusually arid desert regions, which caused the country to be spoken of as the "sandbox of the Holy Roman Empire." The mineral products are alum, lignite, limestone and gypsum. Great flocks of sheep find pasturage in the rolling hill country, and much wool is exported. Beekeeping and fish culture are also of wide enough extent to rank among the chief pursuits. Other industries are the spinning and weaving of cotton and woolen goods, the distillation of brandy and the manufacture of paper. Politically, the province is divided into two districts, those of Potsdam and Frankfort, while the city of Berlin has a separate government. The area of Brandenburg is 15,382 sq. m. Population, 4,092,616.

Brandes, *Brahn' des,* **Georg Morris Cohen** (1842-), a Danish critic and literary historian, born at Copenhagen of Jewish parents. He studied at the University of Copenhagen, where, after several years of travel, he taught from 1872 to 1877. Following a five years' residence in Berlin, he returned to his native city, and henceforth devoted himself to literary pursuits and to lecturing. He is a disciple of Taine, Mill and Spencer, and considers literature a "criticism of life." In his critical writing, which covers a wide field, he is aided by a charming and brilliant style, and his influence has been effective in stimulating modern Scandinavian literature. His most important work is *Main Streams in the Literature of the Nineteenth Century,* a six-volume publication. He wrote besides *Æsthetic Studies, Criticisms and Portraits, Men of the Modern Transition* and *Essays.*

Bran'don, a city of Canada, the capital of Brandon Co., Manitoba, situated 132 m. w. of Winnipeg, in a fertile agricultural region. Among prominent buildings are the Baptist College, the Indian School, two collegiate institutions, a fine Y. M. C. A. Building, several churches, a hospital and a provincial hospital for the insane. Near the city is a government experimental farm. Brandon is the home of the Western Agricultural and Arts Association and is one of the largest horse markets in the West. The industries include sawmills, flour mills and factories for manufacturing furniture, farm implements and cement blocks. It was settled in 1881 and incorporated as a city the following year. Population in 1919, estimated 20,000.

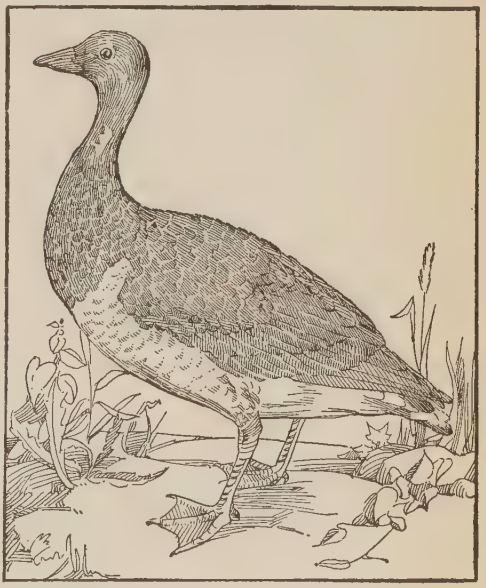
Bran'dy, an alcoholic liquor, usually made by distillation from the fermented juice of grapes. It is also produced from cider and from fruits, as apple brandy, cherry brandy, peach brandy, etc. Cognac, France, produces the finest brandy. California formerly made some very fine fruit brandies. The market always contains a quantity of very inferior stuff labeled brandy that is made principally of corn whiskey, flavored and colored to resemble the pure article. See ALCOHOL.

Bran'dywine", Battle of the, an important battle of the Revolutionary War, fought at Chadd's Fort, Brandywine Creek, midway between Elkton, Maryland, and Philadelphia, Sept. 11, 1777. General Washington was in charge of the American army of 11,000 men. Among his subordinate commanders were Greene and Anthony Wayne. The British force of 18,000 was commanded by General Howe, who took the offensive. During the stubborn conflict a brilliant flank movement by Cornwallis forced the Americans to retreat, but they withdrew in good order. Washington's loss exceeded 1000. The victory opened the way to Philadelphia for Howe.

Brang'wyn, Frank (1867-), an English painter, born at Bruges. He studied in the studio of William Morris, whose attention he had attracted, but his travels in the East seemed to have the greatest effect upon his work. His love for color, combined with a strong sense of their harmony, is his most striking characteristic. Brangwyn has executed many decorative panels, such as those of "L'Art nouveau," Paris, and the British room at the Venice International Exhibition. His best-known pictures are *Trade on the Beach* at the Luxembourg, *St. John the Baptist* at the Stuttgart Gallery, and the *Sweetmeat Seller* at the Carnegie Institute, Pittsburgh. He was elected an associate of the Royal Academy in 1904.

Brann, *Brahn,* **William Cowper** (1855-1898), an American journalist, born in Humboldt, Coles Co., Ill. He spent the first year of his life on a farm, then learned the trade of a printer, then became a reporter and later an editorial writer, in which capacity he was widely known throughout Illinois, Missouri and Texas. In 1891 he launched Brann's *Iconoclast* at Austin, Tex., but only a few numbers were issued. At this time Brann entered the lecture field, and, after the suspension of the *Iconoclast,* became an editorial writer on the St. Louis *Globe-Democrat.*

In 1894 Brann settled in Waco, Tex., and the following February revived the *Iconoclast,* which was successful from the first issue, and within three years reached a circulation of 90,000 copies. Brann possessed an uncompromising hatred of shams and all forms of dishonesty, and these he exposed with all the force of his remarkable intellect and unequaled vocabulary. Withal he was



BRANT

a humorist of a high type, and his journal was both popular and influential, but he naturally aroused the hatred of those whom he exposed, and, on Apr. 2, 1898, he was shot while walking along the streets of Waco.

Brant, or **Black Brant,** a bird of the Goose and Duck Family. These birds are over two feet in length and are black

or sooty brown, with a white collar almost encircling the throat. The nest is a depression in marshy ground, which is lined with down and contains from four to six eggs. This brant is a familiar game bird, breeding on the Arctic shores and wintering along the coast of Lower California.

Brant, Joseph (about 1742-1807), a famous Mohawk chief, whose Indian name was Thayendanegea. He obtained an education at Lebanon, Conn., joined the Episcopal Church and became a missionary to the Mohawks, translating parts of the New Testament into their language. He served the English well in the French and Indian and Pontiac wars, became secretary to Guy Johnson, the superintendent of Indian affairs, in 1774, and during the Revolution fought against the Americans, being present at the Cherry Valley Massacre and at the Battle of Oriskany. He was humane in his treatment of captives, however, and opposed torture. After the war he built an Episcopal church in Upper Canada, with money received while on a visit to England.

Brant Goose, a bird of the Duck Family, a trifle smaller than the Canada goose. It is a brownish-gray above, grayish below, and the head is black with white patches on the side. The nest is placed on the ground, is made of grass, moss, etc., and lined with down. The four eggs are of a light cream color. This goose lives on the seacoast of western Europe and eastern America. It nests only within the Arctic Circle. It is found in large numbers around Hudson Bay in summer, and winters in the South. The brant is an excellent game bird.

Brant'ford, a city of Canada in the Province of Ontario, and the county seat of Brant Co., commonly called "The Telephone City," is situated in a rich agricultural district, on the Grand River, some 65 m. s.w. of Toronto. It is on the Grand Trunk and the Toronto, Hamilton & Buffalo railways and on a branch of the Michigan Central Railroad. The latter road gives it connection to the north with the Central Pacific Railway, and to the south with Lake Erie at Port Dover. Power for manufacturing is supplied by water, natural gas, and electricity from the Hydro Electric Commission and the Cataract Power Company. The leading articles manufactured are agricultural implements of every class, boilers, engines, fire engines, radiators, stoves, furnaces, roofing, shoes, windmills, cement, electric fixtures, brass and iron beds, emery wheels, twine, blankets, underwear, screens, cigars, glue, starch, flour, etc. Brantford is a strong financial center, having branches of all the leading banks. The city was named for the distinguished Mohawk chief, Joseph Brant, whose statue has a prominent place in Victoria Park. It was here that Alexander G. Bell invented and first used his telephone, and his former home is still pointed out to visitors. The Ontario Institution for the Education of the Blind and the Mohawk Institute for the training of Indian children are situated here. The city is noted for its fine homes, beautiful churches, conservatory of music, library, post office, Y. M. C. A. and Bell Memorial. Population in 1919, estimated 30,000.

Brass, an alloy of copper and zinc, being two parts by weight of the former and one of the latter. Brass is cast in molds and is also rolled into sheets. Owing to its susceptibility to a high polish it is extensively used for lamps, gas fixtures, hinges, doorplates, etc. See ALLOY; BRONZE; COPPER; ZINC.

Brat'tleboro, Vt., a city of Windham Co., 77 m. s.e. of Rutland and 60 m. n. of Springfield, Mass., on the Connecticut River, 1 m. below the mouth of the West River, and on the Boston & Maine and the Central Vermont railroads. It is situated in a picturesque, rich farming region noted for its maple sugar, and is the trade center of southeast Vermont. The chief manufactures include children's toys and carriages, hosiery, overalls, furniture and canning machinery. The factories of the Carpenter and Estey Organ companies are also located here. It is the seat of the Brattleboro Retreat (asy-

lum for the insane). The town was first settled in 1724 at Ft. Dummer and was the first permanent civilized settlement in Vermont. Brattleboro was chartered in 1753. It derives its name from William Brattle of Massachusetts, one of the original grantees. The city was incorporated in 1832. Population in 1920, U. S. Census, 8,332.

Brazil', a republic of South America, the third largest political division of the Western Hemisphere. It is bounded on the n. by Colombia, Venezuela and the Guianas, on the e. and s.e. by the Atlantic Ocean, on the s. by Uruguay, Paraguay and Bolivia, and on the w. by Argentina, Paraguay, Bolivia, Peru, Ecuador and Colombia. It is larger than that part of Europe which lies east of France and larger than the United States, exclusive of Alaska. Its greatest extent from north to south is 2660 m.; from east to west, 2700 m. The total area is about 3,218,139 sq. m.

Surface. The physiography of Brazil reveals two distinct divisions of surface. In the northern part are the lowlands occupied by the great river basins of the La Plata and the Amazon-Tocantins. They include about three-fifths of the total area of the country, are generally sandy and are annually flooded, the flood plains of Brazil including thousands of square miles. The Amazon plain is more heavily forested than is that of the La Plata. North of these plains, along the northern boundary of Brazil, are the Guiana Highlands, an isolated mountain system extending from the Negro and Orinoco to the Atlantic Ocean. In the southern part is the most important physical feature of the country, the Brazilian Plateau, also called the Highlands of Brazil. It is a table-land rising from 1000 to 3000 ft. above sea level. There are two important mountain ranges, the Coast Range, consisting of the Serra do Mar, running continuously along the coast, and the Serra da Mantiquiera (known also as the Serra do Espinhaço), farther inland, and the second large system, the Central, or Goyana, composed of an eastern and western range. The highest peak in Brazil is Itatiaia, at an elevation of 8898 ft.

Rivers and Lakes. The rivers of Brazil form the principal means of transportation and commerce, and they are of great significance for they flow through a country abounding in rich natural resources and of remarkable fertility. The Amazon, with its tributaries, draining about two-thirds of the country, represents the largest system of navigable rivers on the earth's surface. With the Tocantins, it drains 2,235,000 sq. m. The other important rivers are the La Plata, Paraguay, Paraná, São Francisco and the Rio Negro (connecting with the Orinoco through the Cassiquiare).

Climate. Brazil lies almost wholly within the tropical regions, but its climate is remarkably even, due to the modifying influences of winds and a comparatively high altitude. There are two distinct seasons, the wet and the dry. The coast regions of the Amazon basin enjoy a heavy rainfall; in some parts of the valley it reaches 300 to 400 inches. This is a densely forested area, and is subjected to the sweep of the trades at all times, while the temperature seldom exceeds 95°. There is also abundant rainfall on the coast of the plateau region, but there it is seasonal, and the range of temperature is greater. The heaviest precipitation occurs in the summer when the sun is south of the equator and the trade winds likewise have moved south. Nearer the interior of the same region the rainfall is deficient; such is also the case in the regions between the São Francisco and the Paraná.

Minerals and Mining. The surface diggings of gold and diamonds have been exhausted, and the rich mines that Brazil possesses have not yet been extensively worked, due to restrictions imposed by mining laws, as well as scarcity of capital and population. The mining carried on in the states of Minas, Geraes and Bahia is the most extensive, and is largely financed by British capital. Next to gold and diamonds the principal minerals are copper, iron, lead, zinc, manganese and quicksilver. The coal, both bituminous

and lignite, is of inferior quality and needs several washings before it can be used; the mining of it is checked by deficient supplies of cheap labor and fuel.

Forests and Lumber. The extensive tropical forest regions are complex and choked with an almost impenetrable undergrowth. The principal trees are the different varieties yielding rubber, the wax palm, and the species in the southeast from which nuts, drugs and dyewood are obtained. Where the rainfall is less, are smaller open forests, and palms, ferns, cacti and smaller trees are found. Lumbering has not yet developed into an important industry.

Agriculture. The development of agriculture has advanced materially within recent years. The principal products are coffee, sugar, tobacco, cotton, maize, rice, sweet potatoes, beans, farina and many other familiar vegetables. In the production of coffee and the growth of the coffee plant, Brazil leads the world.

Manufactures. In the natural course of the development of a country where agricultural and mining products are important, it has naturally resulted that the manufacture of goods closely related to these products should progress the most rapidly. Cotton spinning and weaving, and, secondly, the manufacture of woolens, are the most important. Sugar refining is also extensively carried on, and, in the states of Pernambuco and Bahia, the diffusion process has been substituted for more primitive methods used in other parts of the country (See Sugar). Other industries are the distilling of rum, cigar making, tanning of leather, and the manufacture of soap, candles, paper and minor products. The smelting of metals, the manufacture of agricultural tools and steam engines and shipbuilding also employ many people.

Commerce and Transportation. Railways were being constructed in Brazil as early as 1854. The country now has a total railway mileage of from 15,000 to 20,000 m., and over one-half of this is under government control. Most of the heavy domestic shipping is carried on the rivers and coast waters. Rio de Janeiro is the chief port and receives more than one-third of the exports of Brazil and more than one-half of its imports. Coffee occupies the same place among the exports of the country that wheat does in the United States; less than one-third of the total is shipped to Europe, the bulk of it being received by the United States. Next in importance among exports comes rubber; then cotton, cottonseed, tobacco, hides, maté, cacao and dye. The imports consist of woolen and cotton fabrics, manufactured goods, coal, petroleum and foodstuffs. With the development of the rubber industry, this article is constantly increasing the export trade.

Inhabitants. Among American countries, the population of Brazil is second only to that of the United States. Less than one-half of the people are white, and they are principally immigrants from Italy, Spain, Germany and Portugal, together with a small per cent from Great Britain and the United States. Nearly one-tenth are Indians, and of these about one-half are savages; one-seventh are negroes; and one-third are half-breeds. The Portuguese language is spoken by the majority, and Indian tongues are also numerous.

Government. Under the constitution adopted Feb. 24, 1891, Brazil is a republic, with 20 states and a Federal District. This constitution differs from that of the United States chiefly in that it allows a degree of political independence among the individual states amounting almost to decentralization. The states that are most distantly removed from the capital tend to exercise their rights to such an extent that Federal control is reduced to a minimum. The president, together with the National Congress, exercises the legislative power. The Congress consists of a Senate, composed of three members from each state and from the Federal District. They are elected directly by the people and serve for nine years, one-third of the total number being changed or renewed every three years. The 212 deputies, one for every

70,000 of the population, constitute the House of Representatives. The right of suffrage is granted to that part of the male population which is over 21 years of age and not included among members of religious associations, soldiers, illiterates and beggars. The president's cabinet consists of six ministers representing the following departments: finance, war, navy, foreign affairs, justice and industry, railways and public works.

A council and a prefect control the affairs of the 1023 municipalities into which the states are divided. These municipalities elect the justices of the peace, who, with the commissioner of police, administer justice. There is a standing army, and all the inhabitants are required to take up arms in defense of the country, when necessary. The constitution prohibits wars of aggression.

EDUCATION. Education is not compulsory, and the illiteracy is over 80 per cent. Free schools are provided for primary instruction, and in the larger coast cities there are institutions of secondary and higher type in charge of the Federal Government. There are several technical schools at Bahia, Rio de Janeiro, São Paulo and Pernambuco, also museums and libraries. At Rio de Janeiro is the large National Library, with its magnificent collection of books and manuscripts.

RELIGION. There is no connection between the Church and the State. The Roman Catholic religion is the faith of 99 per cent of the population, and the government provides for its maintenance.

CHIEF CITIES. The important cities, next to Rio de Janeiro, the capital, are Bahia, São Paulo, Pernambuco, Porto Alegre, Pará, Ceará and Manaos.

HISTORY. Brazil was first discovered by Pinzon, a companion of Columbus, in 1500. From 1532 to 1535, the land from 30° south to the equator was divided into 12 vast, indefinite tracts. Each of these was given to a noble or court favorite for colonization; but the scheme failed and the land reverted to the crown of Portugal. As a consequence of the enslaving of natives by the early settlers, an appeal was made to the Catholic Jesuits, who came to Bahia in 1549. After a long conflict, in 1680, the Indians were freed, but negroes who had been brought into Brazil as early as 1530, were forced to take their place on the plantations.

For 60 years after 1580 Spain ruled Brazil, which grew rapidly in population by the discovery of gold in 1691 and of diamonds some 20 years later. In 1763 Rio de Janeiro became the seat of the Portuguese viceroy. In 1807, when Portugal was invaded by France, Brazil was visited by the royal family of Portugal, remaining the seat of government until 1821.

When Portugal decided to reestablish the kingdom, Brazil was in danger of again becoming a colony. To prevent this it revolted. In 1822 it proclaimed its independence, which was not recognized by Portugal till 1825. Dom Pedro I, son of Prince John, was the first emperor. Dom Pedro II, the last hereditary ruler of the New World, ascended the throne at 15. Through his able rule he had made the country fairly harmonious. Nevertheless, Brazil wished to be a republic, and on Nov. 15, 1889, now the national holiday, the emperor was peacefully deposed. For a time distress and disorder prevailed in the new republic; but during the past few years public improvements have been made, and the country's credit has become recognized. Population, 26,542,402. Consult Burton's *Explorations of the Highlands of Brazil.*

Brazil, Ind., a city and county seat of Clay Co., 16 m. n.e. of Terre Haute and 57 m. s.w. of Indianapolis, on the Chicago & Eastern Illinois, the Evansville & Indianapolis, the Terre Haute & Indianapolis and other railroads. Its prosperity is derived chiefly from mines of block coal and the manufacture of pig iron. Inexhaustible deposits of clay and shales are also found here, and there are extensive iron-blast furnaces and collieries of block coal, which is used as fuel for the purpose of smelting iron ore. The city has rolling mills and machine shops and manufactories of railroad spikes,

boilers, engines, tile, mining machinery, pumps, sewer pipe, brick and turnbuckles. Brazil was settled in 1856 and incorporated in 1873. Population in 1920, U. S. Census, 9,293.

Brazil Nut, the seed of a South American tree of the Myrtle Family, common in the United States through exportation. The tree is large and branching, with broad but tapering leaves, which are deeply-veined. The tree often grows to a height of 120 ft. and produces a valuable wood. The fruit is a large, woody-shelled nut, which contains from 18 to 30 three-angled, dark-covered seeds, commercially known as Brazil nuts. These seeds are sweet and very oily and are sold not only as a food product but also as a source of an illuminating oil. The kernel is white and adheres closely to the shell. In the United States the Brazil nuts, or more accurately, Brazil seeds, are commonly known as "nigger-toes" or cream nuts.

Brazil'wood, a wood from various trees of the Pulse, or Pea, Family, used as a producer of red and brown dyes. The plant from which it is most commonly obtained is a small tree growing on rocky lands in the tropics. Its leaves are light green and composed of several pairs of oval leaflets; the flowers are in long, drooping clusters. The dyestuff, or brazilwood, is the heartwood of the tree; when cut its color is light yellow, but exposed to the air it becomes red. For use it is ground to sawdust and treated with alcohol or ether, and is then ready to be employed in the manufacture of ink or dyes for the calico printer.

Bread, *Bred,* a familiar cake or loaf, made principally of flour or meal, baked and served as a food. The word carries different meanings to people of different countries, since the ingredients of bread depend upon the staple crop of the country where it is made, and the shape of the loaf depends largely upon custom and upon the utensils at hand.

Bread Making. Modern bread making differs greatly from that of the time when the Egyptians molded clay with their hands but kneaded bread with their feet. Though much bread is made in private homes, in cities by far the greater amount comes from the bakeries, where the process is largely carried on by machinery. In these great "bread factories" the ingredients are first tested in laboratories, and the most scrupulous cleanliness prevails everywhere. Compressed yeast generally forms the leaven. This is dissolved in warm water and flour is added; the paste, known as the sponge, is left for several hours to "rise." In this process the yeast plants feed upon the solutions and cause in them a chemical action, which changes them to carbon dioxide and alcohol; the gas formed pushes up through the dough, making it light. The other ingredients, differing according to the kind of bread made, are then added and the whole placed in a "mixer" having a revolving central shaft with horizontal arms; here the whole is thoroughly kneaded and again left to rise. During this latter process it is occasionally beaten down again. It is now ready to be molded into loaves, and then, after rising for the last time, is placed in the oven to bake. The oven of a modern bakery holds from 300 to 500 loaves at one baking.

History. The making of bread is an old, old process now known to have been carried on as early as the Stone Age. The cakes then made were far different from our light, white loaves and were probably made from grains, chiefly barley or wheat, pounded between stones, soaked in water or oil and dried in the sun. Other forms of bread were made from the meat of the acorn and of the beechnut. These cakes, though familiar, did not occupy the place that bread now does upon the bill of fare, and fruits were the staple food.

Just when and how yeast, or leaven, was introduced is not known, but it was probably by some happy accident; that its use was known long ago is evident from the fact that both leavened and unleavened bread are mentioned in the Old Testament. Black bread, barley bread and white bread were all made in early

times in Egypt and in Greece, and public bakeries, where loaves resembling the modern biscuit were made, are depicted in ancient carvings. But white bread was long the food of the rich alone. In fact it is only in recent years, since the invention of the reaper, that wheat bread has become the "staff of life." Now it is sold daily by the thousands of loaves and so cheaply that to be "without a crust of bread' is a synonym for abject poverty. This helps to account for the fact that nowadays the average amount of wheat consumed by one person in the United States yearly is five bushels, and it is safe to say that the most of that is in the form of bread. Bread contains the elements most necessary to man's life, and he can live upon it and water, homely as the fare may seem, without danger to his health.

Kinds of Bread. The process of bread making discussed above refers especially to the familiar yeast bread. Salt-rising bread is made without yeast and depends for its "rising" upon the life of the meal with which it is started.

Vienna bread is made in long loaves that are washed in a cornstarch solution and baked without tins upon the bottom of a steam-charged oven; thus the characteristic tough crust is formed. *Aerated bread* is made with water charged with carbon dioxide and is kneaded under pressure; when the pressure is removed the gas expands and the dough is rendered light. *Brown bread* is made with graham flour and sometimes with the addition of molasses. *Whole wheat bread* is made from wheat flour that contains all of the kernel; it is light brown in color.

Bread Around the World. In the West Indies bread is made from cassava meal and is molded by hand into thin, round cakes. The bread of Central America is called tortillas and is made from corn parboiled, crushed and baked; it is served hot, and it is no uncommon sight at the trains to see the women, each with her handful of dough and portable charcoal stove, tempting passengers with her wares. India has several kinds of bread: chapatties, which are unleavened cakes, molded by hand and baked on a griddle like pancakes; barley bread, which is more like biscuits; hoppers, which are loaves made of rice flour; and still another variety made of millet and corn meal. The Egyptians roll their bread dough as thin as pie crust and pinch the edges of two cakes together; when baked these become inflated and are as deceitful in appearance as an unfilled cream puff. In many European countries barley bread is a favorite food. Sometimes this is rolled thin, baked on a griddle or flat hot stone and then stored in a dry place for winter use. See Study Guides.

Bread'fruit", a small tree of the Nettle Family and a relative of the mulberry. It is found in tropical countries and is a tree of some consequence in the islands of the southern Pacific, where it furnishes the natives food, clothing and building material. The leaves are broad and much-lobed at the top, with pointed divisions. The fruit is globular and is made up of a number of small fruits covered by a coarse, irregular, yellow rind. It has a fibrous, juicy pulp, which, before being fully ripe, is mealy and white. It is eaten raw or cooked in localities where the trees are common, but is not shipped to other localities. The tree received its name because the cooked fruit has somewhat the taste and consistency of new bread.

Break'wat"er, a barrier which protects a harbor entrance, or what would otherwise be an open roadstead, breaking the force of waves, however violent, and making it a safe place of refuge for shipping. Islands, peninsulas, bars of sand or clay and reefs of rock are natural breakwaters. Artificial breakwaters are of different kinds and of varying design. A few are open, wooden frames of very heavy timbers, which are securely anchored where some protection is needed, but great expenditures are not justified. Many breakwaters are built out from a cape or headland, and are thus a part of the land itself. Most of them, however, are insular, and are built up from the bottom of the sea, the foun-

dation being of coarse rock and the superstructure of timber and rock, or very commonly now of concrete. Since the force of the waves is estimated, in some places, at from 1000 to 6000 lb. per square foot, but is determined largely by the angle at which they strike, a breakwater should be located with reference to the element of permanent safety, as well as with regard to the size and character of the area to be protected. Some of the most noted breakwaters are those located respectively at Plymouth, England; Cherbourg, France; Delaware Bay; and Buffalo, N. Y.

Breast'work". See FOR"TIFICA' TION.

Breck'inridge, John Cabell (1821-1875), an American soldier and statesman, vice-president of the United States, born near Lexington, Ky. He attended college, studied law and settled in Lexington, where he practiced his profession with success. He served in the Mexican War as major of volunteers. At the close of the war he entered the Kentucky Legislature and was elected to Congress for two terms, 1851 to 1855. In 1856 he was elected vice-president of the United States, with Buchanan as president. In 1860 he was nominated for president by the slave-holding wing of the Democratic convention, and received 72 electoral votes. He entered the Senate in March, 1861, but left to join the Confederacy a few months later. He took part in the battles of Shiloh, Baton Rouge, Murfreesboro, Chickamauga, Chattanooga, Cold Harbor and others, and rose to the rank of major-general. From January to April, 1865, he was secretary of war in the Confederate cabinet. When it was decided to abandon the contest he went to Europe, but returned in 1868 and practiced law in Kentucky until his death.

Brem'en, a free city of Germany located upon the Weser River, 60 m. s.w. of Hamburg. It is an old city, and in its central part are found the narrow, crooked streets and historic buildings of its earlier days. The modern city, built about the Old Town and chiefly upon the right bank of the river, has wide, pleasant streets and beautiful homes. Among the most historic buildings are the cathedrals, the old Town Hall and the Chamber of Commerce Building. There are also many monuments and memorials of artistic and historic importance. Of its modern buildings, the finest are the Imperial Bank, the Trades Hall, the Museum and the Society of Art Building. Bremen is an active port and an important center of trade. It is one of the greatest tobacco markets of the world and is one of the chief ports from which emigrants leave for America. There are extensive docks and shipyards, rice mills, breweries, machine shops, jute mills and distilleries. Population, 246,900.

Bre'mer, Fredrika (1801-1865), a Swedish novelist, born near Åbo, Finland. The rigid discipline of the home was ill suited to her restless, affectionate nature. She wrote verses at the age of eight, and in 1821 the family removed to France. The poetry of Schiller made a deep appeal to her; her early productions were successful. She traveled on the Continent, lived in Norway for some time and visited America. On her return to Stockholm she undertook schemes for the emancipation of women and devoted herself to general philanthropic and social work. Her novels were popular, and she was awarded the smaller medal of the Swedish Academy. Best known are *The Neighbors, The President's Daughters, Brothers and Sisters, The H. Family, Nina, The Home* and *Hertha.* Her impressions of American life are recorded in the volume *Homes in the New World.* The English translations of her early works by Mary Howitt are admirable and made Miss Bremer even more popular in England and America than in Sweden.

Breslau, *Bres' lou,* an important industrial city, and the capital of Silesia, situated on the banks of the Oder, 350 m. from its mouth. Among its chief buildings are several medieval Protestant and Catholic churches, handsome government offices, the royal palace, an extensive library, the university and sev-

eral other schools. The monuments in the city are numerous and exceptionally fine. Breslau is a commercial and industrial center, of which the principal manufactures are railway carriages, furniture, gold and silver work, liquors, cigars, porcelain, glass, furs, cloth and paper. The city was founded before 1000 A. D., was early made a bishopric and was ruled successively by Poland, Hungary, Bohemia and Austria. It was conquered by Frederick II of Prussia in 1741. Population over 500,000.

Brest, a seaport of Brittany, France, situated on the Bay of Brest, at the mouth of the Penfeld River, 389 m. by rail w. of Paris. Its harbor represents one of the principal French naval stations, and is fully equipped with docks, breakwaters, quays and piers. The only industry consists of furnishing naval supplies and the equipping and repairing of ships. Submarine telegraphic communications are maintained with the United States, and the latter country is represented in Brest by a consular agent. Near the end of the 17th century it was made into a fortress by Vauban. Population, about 85,000.

Brest-Litovsk, *brest lye tofsk',* formerly a first-class fortress in the western part of Russia, capital of a district in the government of Grodno. It is situated about 100 miles east of Warsaw, at the junction of the Bug and Mukhavetz rivers. Captured and nearly destroyed by the Germans in the World War, Brest-Litovsk was made the headquarters of the German commander in occupied Russia, and here the Russian and German delegates met in 1917-1918 to negotiate the treaty of peace between Germany and Russia. This treaty, which was signed in March, 1918, foreshadowed the dismemberment of Russia, but the allies forced Germany to abandon it at the close of the war. Brest-Litovsk was a thriving commercial center before the war, as it was situated at the junction point of railroads connecting Odessa with Konigsberg and Moscow with Warsaw. Population, 63,579.

Breton, *Breton',* **Jules Adolphe** (1827-1906), a French painter of peasant life, born at Corrières. Beginning as a painter of historical subjects he soon turned to scenes of rustic life. His work in this field shows sympathy of feeling, though it lacks the vigor and power displayed in similar lines by his countryman Millet. His most popular canvases are *The Return of the Gleaners, Song of the Lark, The Return of the Harvesters* and *The Shepherd's Star.*

Brewer, David Josiah (1837-1910), an American jurist, born in Smyrna, Asia Minor. His father was an American missionary. The son graduated from Yale in 1856 and from the Albany Law School two years later, beginning practice in Leavenworth, Kan. He became probate judge in 1864, justice of the State Supreme Court in 1870, and United States circuit judge in 1884. In 1889 President Harrison appointed him an associate justice of the United States Supreme Court. He was a member of the Venezuela arbitration tribunal.

Brew'ing, the art of making fermented beverages without distilling. The process is divided into two stages, malting and brewing.

Malting. Malting is sprouting of the grain. Barley is steeped in cold water for two or three days in order that it may absorb water, swell and soften; then it is heaped up in small piles on a floor in a moist, warm room. The grain is watched carefully until hairlike roots appear, when it is spread on the floor of the malt house until the desired stage is reached. The grain is then removed to a drying room, where fermentation is stopped by the action of heat and the barley has become malt.

Brewing. In brewing, the malt is first crushed in order to liberate the starch grains, and in this state it is called grist. The grist is cooked with hot water to form mash, which is allowed to stand for several days. The liquor is carefully drawn off from the mash and is known as the wort. After standing for a few hours, it is boiled in copper boilers with

hops, the tannin of which clarifies the wort by coagulating the albumin. The hop oil gives the beer an aroma, and the hop resin gives the bitter taste and tonic effect. The wort is next fermented in large vats or tanks, the process being started by adding yeast.

This process is continued for about ten days, or until the sugar has been converted into alcohol and the liquid becomes beer, which is left for some time in cold-storage tanks to mature before use.

Brews'ter, William (about 1560-1644), clergyman and leader of the Pilgrim Fathers, was born at Scrooby, in northern England. He was educated at Cambridge, and was secretary to Davison, who was one of Queen Elizabeth's secretaries. Having left the State Church, he was so persecuted that he fled with a party to Amsterdam, Holland (1608), shortly afterwards opening a school at Leyden, where he dwelt for 11 years. In July, 1620, with Bradford, Miles Standish and a small band, Brewster made the Pilgrims' initial and short trip in the ship *Speedwell*. Foremost among those who finally landed from the *Mayflower at Plymouth,* he there had charge of the church, being sole preacher and ruling elder until 1629.

Brick, a well-known building material produced by molding and burning clay. The earliest bricks were, no doubt, the sun-dried bricks of Egypt, Assyria and Babylonia, some of which have been preserved for 3000 years, owing to the warm, dry climate of those countries. All of the bricks made in ancient times, whether baked by the sun or in kilns of fire, were made of clay mixed with straw or grass. Since the Greeks had plenty of stone they devoted but little attention to brickmaking, but the Romans employed bricks and introduced them into England. Bricks were made in America as early as 1612 in Virginia, and in 1835 Nathaniel Adams invented a hand-power brick machine, which was used at Cornwall, N. Y.

Common Building Bricks. These are made of clay that can be well molded and burned to a hard, uniform texture and color. In the United States the size of a standard common brick is 8¼x4x-2½ inches. Bricks are classed as arch, red or salmon, depending upon whether they are burned from the center, inner or outer portions of kiln.

Front Bricks. These are known as pressed, repressed, Philadelphia pressed or face brick, and should be smooth, with well-defined, sharp edges and of uniform color and equal texture. These bricks are employed for the front or the exposed portions of buildings where good appearance is desired. Formerly these were molded by hand, and after drying for a short time were pressed in a hand press; but now pressed bricks are ordinarily made under high pressure by machinery. The term *repressed* is used to designate bricks which are pressed a second time for better form or clearer definition of the edges.

Manufacture. When molding is done by hand, the clay, after being ground with water, is placed in sanded molds, which are dumped on the ground, leaving the soft bricks to dry, after which they are burned. Molding machines may be said to comprise soft-mud, stiff-mud or wire-cut and dry-pressed types. The soft-mud machine has an upright box of wood or iron containing a vertical shaft, with curved arms, which, revolving against a mass of clay and water, forces out enough to fill the molds, which automatically enter at the bottom. As each mold is filled and withdrawn, it is moved to a delivery table for the wheeler to carry to the drying shed. Stiff-mud machines handle the tempered clay in a stiff condition, that is, with only sufficient water to make it plastic, and, by means of an auger-shaped device revolving in a cylindrical case, force the clay through a die in the form of a column or continuous stream, when it is cut off by wires into proper lengths. The stream of clay may be cut endwise or sidewise, the machine and product being accordingly known as end cut or side cut. Dry-press machines require the clay to be finely pulverized, screened and seasoned

by storage, and it is afterwards fed into a hopper; and by either toggle-jointed levers operated by cams or by hydraulic pressure, the clay is pressed into the molds, from which the bricks can be taken directly to the kiln. It is better, however, to dry them in tunnels with artificial heat before burning them.

After the bricks have been formed either by hand or machine, they are laid flat on the ground or on pallets for drying; if made on die machines sufficiently stiff they can be piled on edge on top of each other either in the open air or under sheds. However, it is preferable to dry them in tunnels, as the operation then can be continued during inclement weather, and the bricks burn more uniformly when properly dried. The burning of bricks requires considerable skill, and the method and pattern of kiln used depend on the kind of clay employed and the value of the product. Common bricks are usually burned in kilns, with furnaces arranged on two sides, making two walls, and the ends of the outer layer are plastered over with clay, when the kiln is filled with raw brick from the drying sheds. Wood is generally used at first to drive off the moisture and afterwards coal is used. There are some clays that will stand intense heat, and in this case oil-burning kilns are employed. Paving bricks are practically common brick burned to vitrifaction, so as to secure hardness and not absorb moisture. Fire bricks are made in the same way as common bricks, but made of refractory clays. Ornamental bricks are usually made of terra cotta. See TERRA COTTA.

Bridge, *Brij,* a structure of wood, stone, brick, iron or other material affording a roadway over a body of water or above the general level of the ground. It has two parts, the substructure, or foundation, and the superstructure, or bridge proper. Bridges are divided into several classes, dependent upon the character of the superstructure. A girder bridge is on the principle of a plank across a stream; an arch bridge, as its name implies, is one composed of arches; a suspension bridge is supported like a suspended platform, held up by looped cables; a truss bridge is one in which a truss or a structure, held rigid by upright and cross braces, is employed.

GIRDER BRIDGES. For the purpose of bridging short spans and especially for railroads where the loads are heavy, the girder bridge is frequently used. Since steel plates, I beams and other shapes of steel can be so readily riveted together as to form a girder of almost any dimension, in length, thickness and breadth, this form of bridge offers a simple construction adaptable for crossing narrow streams and depressions.

ARCH BRIDGES. The arch was first used by the Romans for bridges and other structures, and their work was distinguished more for its durability than for the length of span of the arches or the beauty of their design. One of the earliest Roman bridges was built by Augustus over the Nera at Narni, and contained four arches, the longest having a span of 142 ft. Formerly arch bridges were built of stone or brick, but steel and concrete construction is now more often employed. See ARCH; CONCRETE.

TRUSS BRIDGES. When a beam is not solid but made up of a network of rods, plates and bars, so braced that the whole acts like a single beam, it is termed a *truss.* Trusses are of various kinds, depending upon the manner of assembling and bracing the beams, uprights and diagonals, and may be said to be either simple or arched. A simple truss is one supported at its two ends and exerting no lateral pressure, while an arched truss exerts both a lateral and vertical pressure upon its supports. Truss bridges were formerly made of wood, and there are still some remarkable evidences of skill shown in their design, as found in various parts of Europe, China, the Philippines and in the United States. Owing to their lightness and the ease of erection, truss bridges are a favorite pattern for both highways and railways, replacing often those of wood and masonry. The Eads Bridge crossing the Mississippi River at

St. Louis is an example of an arched truss bridge, having three arches made up of steel trusses, the central one of which has a span of 515 ft., and the others of 497 ft. each.

Tubular Bridges. A form of the girder bridge is the tubular, which consists of either a rectangular or circular tube made of steel plates riveted together and supported by resting on pins and abutments. The roadway is through the tube, and provision is made for crossties and rails. An example of this is the Britannia Bridge over the Menai Straits in Wales. It has two spans of 450 ft. and two of 250 ft. The tube is

TRUSS BRIDGE

1380 ft. long, 28 ft. deep and 13 2/3 ft. wide, and is made up of cast- and wrought-iron plates. Formerly the Victoria Bridge across the St. Lawrence River at Montreal was one of the largest and finest tubular bridges in the world, but it was replaced in 1898 by one of a steel-truss pattern. The Victoria was a railway bridge nearly one and three-fourths of a mile long, with a central span 330 ft. long, and 24 spans 242 ft. long. It was built at a cost of $7,000,000. Tubular bridges have been superseded by other forms, as they were found to be expensive in maintenance.

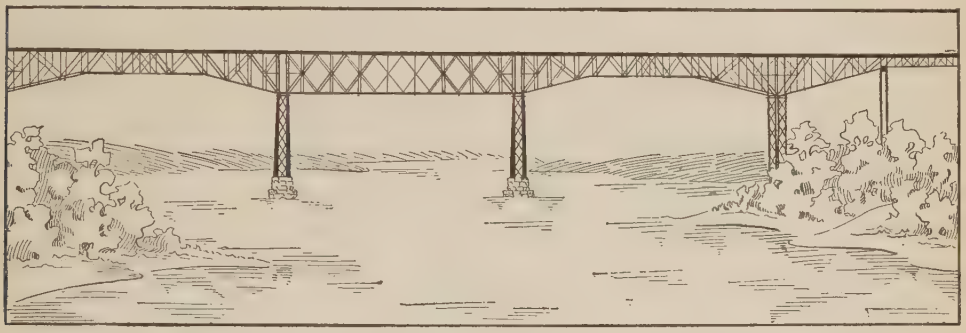
Cantilever Bridges. A cantilever bridge has a trussed shore arm and a trussed river arm, which are supported near the middle in such a way as practically to balance each other. The river arms are joined by a central truss, and the entire structure is so designed and arranged that all strains are evenly divided. The cantilever principle is considered good engineering and bridges of this pattern are replacing those of other types, for the reason that they are cheaper to construct and require no preliminary or false work under them during their erection. When building bridges upon navigable streams, this feature is important, as the river arms of the cantilever can be extended from the towers, making them self-supporting during their erection, and when joined by the center truss, the structure is complete.

Suspension Bridges. A suspension bridge has a platform supported by cables, which are held in position by passing over the tops of the towers and fastening them to an anchorage at the abutments. The first bridge of this type was built in England in 1819, but the great event in bridge building in the United States was the erection of the celebrated suspension bridge over the Niagara River in 1854. This was not only the first great railroad bridge, but it was the means of extending the railroad systems westward. In 1883 the Brooklyn Bridge over East River, connecting the cities of New York and Brooklyn, was completed, and was at that time considered the greatest suspension bridge in the world, but in 1903 it was exceeded in grandeur and length of span by the Williamsburg, or East River, Bridge, which is located about a mile and a half farther up the river. The Williamsburg Bridge has a central span of 1600 ft. between the towers, with a

land span at each end of about 600 ft. Its approach on the New York side is 2500 ft. long and on the Williamsburg side 1700 ft. long; its towers are 335 ft. high and its platform 110 ft. wide, which provides on its upper deck for an elevated railway track and two footpaths, while on the lower deck there are two electric-railway tracks and a driveway. The platform of this huge structure is supported by four immense cables 17 inches in diameter and containing over 10,000 strands of number-eight steel wire.

DRAWBRIDGES. These bridges are constructed so as to be readily moved in order to allow the passage of vessels. They are of three types: the swing bridge, consisting of a span supported on a central pier and made to revolve on a turntable; a lift bridge, so designed that it can be elevated to a height sufficient for vessels to pass under; and a roller bridge of the bascule pattern. This bridge has its span in two parts of equal length, so arranged that when closed these parts form a complete arch. When it is desired to open the bridge, each part of the span is made to assume a position near to a vertical one, by having the ends which rest on the abutments balanced and moving on rollers. This form of bridge is well adapted to narrow channels in cities.

MODERN BRIDGE DESIGN AND CONSTRUCTION. The bridge engineer in designing a bridge calculates to a nicety the stress and strain which each individual member will have to bear. This not only covers the loads which the structure will have to support ordinarily, but provision must be made for extra loads and the force of the wind, etc. The ability of the modern steelworker to roll bars, plates and beams into such a variety of shapes and sizes, and the facilities for boring, drilling, sawing, riveting and fitting these together are such, that the bridge engineer is given new opportunities for designs and construction. The result of this will be that the spans of steel bridges that are now considered long, will be exceeded in future constructions.



CANTILEVER BRIDGE

Bridge Pe'wee. See PHŒBE, *Fe'be.*

Bridgeport, Conn., a city, port of entry and one of the county seats of Fairfield Co., 18 m. s.w. of New Haven and 56 m. n.e. of New York, on Bridgeport Harbor, an inlet of Long Island Sound, at the mouth of the Pequonnock River and on the New York, New Haven & Hartford and other railroads. The electric railroad service with the near-by towns and cities is thoroughly developed. Lines of coast steamers connect the city with various ports. There is also ferry connection with Port Jefferson directly across Long Island Sound. The harbor is excellent and there is considerable coastwise trade. East Bridgeport is situated on a peninsula between the river and an inlet and contains many large manufacturing establishments. The main portion, however, lies west of the harbor and the Pequonnock River.

Parks and Boulevards. The city, which is the third in population in the state, is built on level ground and occupies an area of 15 sq. m. There are several large parks, Beardsley in the northern part and Washington and Seaside along the Sound being among the number. Seaside Park contains statues of P. T. Barnum and Elias Howe and a soldiers' monument. In the northwest portion of the city is an eminence called Golden Hill which commands a beautiful view of the Sound, and many elegant residences are located here. Black Rock, which forms a suburb of Bridgeport, is a noted summer resort and its harbor is a popular anchorage place for yachts.

Institutions. The most notable institutions are the Burroughs Home for aged women, Burroughs Public Library, Sterling Widows' Home, Barnum Memorial Institute occupied jointly by the Bridgeport Scientific and Historical Society and the Medical Society, St. Vincent's and Bridgeport hospitals, a custom-house and an orphan asylum. Bridgeport is the winter headquarters of Buffalo Bill's Wild West Show and of Barnum & Bailey's circus.

Industries. The city has extensive manufactories, which include automobiles, carriages, firearms, sewing machines, hats, corsets, ammunition, aluminum and brass goods, heavy forgings, ordnance and hardware, plush and silk goods, graphophones, typewriters, bicycles, monumental bronze, belting, undertakers' supplies, fur and leather goods, lamps, pottery, britannia ware, cutlery and edge tools.

History. The first settlement was made in 1659 on lands purchased from the Paugusset Indians and was called Pequonnock. This settlement formed a parish in the towns of Fairfield and Stratford until 1800, when the place was incorporated as a borough and the name changed to Bridgeport. In 1832 the first Bridgeport steamer, the *Citizen*, began regular trips to New York. In 1854-55 P. T. Barnum bought large tracts of land in East Bridgeport and did much for the city. Elias Howe also built a large sewing-machine factory here in 1863. Bridgeport was chartered as a city in 1836. It was enlarged by additions in 1870 and 1899. Population in 1920, U. S. Census, 143,555.

Bridges, Robert (1844-), an English poet. He was educated at Eton and at Corpus Christi College, Oxford, later studying medicine at St. Bartholomew's Hospital, London. He became regularly attached to the staff of St. Bartholomew's Hospital and of the Children's Hospital, and practiced medicine until 1882. Thereafter he devoted himself to literature, especially to poetry. In 1913 he succeeded Alfred Austin as poet laureate. The poetry of Mr. Bridges is somewhat apart from the current verse of his day. Both his poems which employ the familiar English rhythms and those in the classical meters are technically almost faultless, and are marked by purity of taste and diction, restraint and delicacy. He has high rank as a lyricist. His critical works include *Milton's Prosody* and *John Keats, a Critical Essay*. An edition of his poetical works was issued in 1913 by the Oxford University Press. His poetry embodies a definite theory of prosody.

Bridge'ton, N. J., port of entry and county seat of Cumberland Co., 38 m. s. of Philadelphia, on the Cohansey River and on the West Jersey & Seashore and the Central of New Jersey railroads. Steamboats ascend the Cohansey to this place. It is a very old settlement, having been a place of considerable importance before the Revolutionary War. The city has many buildings of interest, a public park and a noted athletic field. Among its educational institutions are the South Jersey Institute, the West Jersey Academy, Seven Gables, Seminary and Ivy Hall Seminary. Bridgeton has good transportation facilities and is the trade center for a large market-garden and agricultural region. Its manufactures include glass, nails, gas pipe, woolen goods, shoes, flour, oilcloth, carriages, etc. Fruit and vegetable canning is also

extensively carried on. Population in 1920, U. S. Census, 14,323.

Bridge'water, Mass., a town of Plymouth Co., 27 m. s. of Boston, on the New York, New Haven & Hartford Railroad. A number of villages are included within the limits of the town. There are manufactories of brick, iron products, cotton goods, paper, nails and tacks. There is also a cotton-gin factory and large foundries and machine shops. A state normal school is located here. The town has a state farm and state almshouse. Population in 1920, U. S. Census, 8,438.

Bridge Whist. See WHIST.

Brig. See SHIP.

Bright, *Brite,* **John** (1811-1889), an English statesman and orator. In 1839 he became closely associated with Richard Cobden, and with noble zeal devoted himself to the repeal of the Corn Laws. He opposed Lord Ashley's factory legislation on the ground that workers and employers should settle their own difficulties. For this attitude he incurred public censure. He was also strongly opposed to the Crimean War and made some of his best speeches in Parliament against it. His attitude toward this war and in regard to China lost him his seat in Parliament for Manchester in 1857, but he was soon returned for Birmingham and remained one of its representatives.

Bright was in favor of Lord Derby's bill to transfer the government of India from the East India Company to the Crown. He was also one of the leaders of the great reform movement of 1859-1867, and stood for the North when Civil War broke out in the United States. Under Gladstone's government he was president of the Board of Trade and lent his aid to the Irish Church Disestablishment Act, the Irish Land Act and the Elementary Education Act. He again entered the cabinet when his party returned to favor in 1880, but resigned two years later, as he could not sustain the government's policy in Egypt. Bright was a pure patriot, enthusiastic for progress, and he ranked among the best orators of his day.

Bright's Disease, a disease of the kidneys, so-called because Robert Bright (1789-1858) was the first to diagnose it. The malady may be caused by prolonged exposure to cold, by certain heart diseases that obstruct the circulation, or by poisons, such as alcohol, lead or arsenic, or by the toxins produced during yellow fever, cancer, scarlet fever or gout. It may take the form of congestion, inflammation or degeneration of the kidneys. Among the symptoms are pain in the loins, indigestion, frequent urination and pallor. The treatment usually prescribed for the disease is life in the open air, change of scene and climate, a decrease of sugar and starch in the diet and an increase of fat, and an abstinence from alcoholic beverages and tobacco. See KIDNEYS.

Brim'stone. See SULPHUR.

Brin'ton, Daniel Garrison (1837-1899), an American archæologist and ethnologist, born in Pennsylvania and educated at Yale, at Jefferson Medical College and in Paris. He was medical director in the army from 1862 to 1865, and for 20 years following the war he edited the *Medical and Surgical Reporter.* He was professor of ethnology at the Philadelphia Academy of Natural Sciences and professor in the University of Pennsylvania. His works include *Notes on the Floridian Peninsula, American Hero Myths, Aboriginal American Anthology, Primer of Mayan Hieroglyphics* and *Religions of Primitive Peoples.*

Brisbane, *Briz' bane,* the capital of the Province of Queensland, Australia. It is located in the eastern and southern part on the Brisbane River, about 25 m. from its mouth. The harbor is an excellent one, and the river has been dredged so that the largest steamer can ascend to the city wharves. The city was first settled in 1825 by Thomas Brisbane and was designed as a penal colony for the British Isles. Its fine location, however, led to its rapid growth, and at present it is a pleasing modern city with many

handsome public buildings, excellent schools and colleges and a well-stocked botanical garden. Hides, wool and cotton are the chief exports. Population, about 161,938.

Bris'tol, a city and civic county of England, situated at the confluence of the rivers Frome and Avon, about 11 m. n.w. of Bath. The public buildings include the richly designed Church of St. Mary Redcliffe, St. James Church, the cathedral, remains of an ancient castle and many old houses in the central part of the city, together with the residences of the wealthy, particularly in the suburb of Clifton. The city owns many of its civic improvements and has a prominent shipbuilding industry and a flourishing trade. John Cabot sailed from this port in 1497, on the voyage which ended in the discovery of the mainland of North America, and the port was long prominent in other early discoveries and commercial enterprises. Bristol was known to history before the Roman invasion. It received a charter from Henry II in 1171, and the rights of a county from Edward III. In 1831 occurred the "Bristol Revolution," at the time of the Reform Bill agitation. Bristol was the birthplace of Coleridge, Chatterton, Southey, Sydney Smith and Hannah More. Population 361,573.

Bristol, Conn., a city of Hartford Co., 18 m. s.w. of Hartford, on the New York, New Haven & Hartford Railroad. There are foundries, tool factories and machine shops and manufactories of woolen and knit goods, tableware, bells, brass goods, water wheels, clocks and engines. There is a public library. Electric railways connect with all the near-by towns and cities. Bristol was incorporated as a borough in 1893. Population in 1920, U. S. Census, 20,620.

Bristol, Pa., a city of Bucks Co., 20 m. above Philadelphia, on the Delaware River, opposite Burlington, N. J., with which it is connected by ferry, and on the New York Division of the Pennsylvania Railroad at the terminus of the Delaware & Lehigh Canal. The city is noted for its mineral spring. It has a foundry and rolling mills, a carpet factory, hosiery, yarn and cassimere mills, a wall-paper factory and patent-leather works. The town was settled in 1681 and originally called Buckingham. A detachment of the American army was stationed here during part of the Revolution. Bristol is situated in a rich fruit and truck-farming region and is an important trade center. Population in 1920, U. S. Census, 10,273.

Bristol, R. I., port of entry and county seat of Bristol Co., 15 m. s.e. of Providence, on Narragansett Bay and on the New York, New Haven & Hartford Railroad. It is separated from the city of Fall River by Mt. Hope Bay. There is an excellent harbor and Bristol has a large daily passenger and freight service for Providence and Fall River. The widely known Herreshoff shipbuilding works and the Saunders & West yacht-building yards are located here. Its manufactures include rubber, woolen and cotton goods. There are also large market-gardening and coast-trade interests. The Narragansett village, Mt. Hope, is within the limits of the town of Bristol and is the site of the residence of Massasoit and King Philip. It was near this place that the latter was killed in 1676. Bristol was first settled by the whites in 1680. It was incorporated as a town in 1746. Population in 1920, U. S. Census, 11,375.

Bristol, Tenn., and Va., a city lying partly in Sullivan Co., Tenn., and partly in Washington Co., Va., the boundary line of the two states extending through the principal street and dividing the town almost equally. The post office is Bristol, Tenn., or Va. Entering the city are the Southern, the Norfolk & Western, the Virginia and Southwestern and other railroads. The city lies in a beautiful valley surrounded by mountains and is 1760 ft. above sea level. It is in a section rich in mineral deposits and is a distributing point for coal, iron and coke. There are iron furnaces, lumber mills, tanneries, tobacco factories, furniture factories, pulp mills, packing houses, a pump factory and manufactories of

staves, barytes, patent medicines and bark extract. The principal institutions are King's College (Presbyterian), Southwestern Virginia Institute (Baptist), Sullins College (Methodist Episcopal, South) and a normal college for negroes. Bristol was settled about 1835. That part of the city lying in Virginia, formerly called Goodson, was chartered in 1890. Bristol, Tenn., was incorporated in 1856. The charter provides for two mayors and two councils. Population in 1920, 8,047 in Tennessee, and 6,729 in Virginia.

Bris'tol Channel, an arm of the Atlantic Ocean separating southern Wales from the southwestern counties of England. Its coast is indented by many bays and at the eastern extremity is the long estuary of the Severn. The tide of the channel meeting the current of the Severn causes the phenomenon known as the bore. During the spring tide the water along the shore rises nearly 40 ft., the highest of any place on the English coast.

British Association for the Advancement of Science, The, a scientific society organized in England in 1831. Its purposes are to extend knowledge acquired through discovery and to assist in original research by bringing together men from all departments of science. The association holds annual meetings in different parts of the United Kingdom. In 1884 it met in Montreal and in 1897 in Toronto. The society is divided into sections, and the sections hold separate meetings during a part of the program. The organization was founded largely through the efforts of Sir David Brewster, and is one of the most prominent scientific societies of the world.

British Columbia, the most westerly province of the Dominion of Canada, bounded on the n. by Yukon and Mackenzie, on the e. by Alberta, on the s. by the United States and on the w. by the Pacific Ocean and Alaska. Its length from north to south is 720 m.; its area, including islands, is 357,600 sq. m., of which 2439 sq. m. are water. It is three times the size of the United Kingdom, six times as large as Germany and larger than California, Oregon and Washington combined. Population is over 400,000.

Surface. British Columbia is a land of mountains and valleys. The main range of the Rocky Mountains forms a part of the eastern boundary and the range extends the entire length of the province. The mountain system comprises several parallel ranges whose combined width in the southern half of the province is 400 m. Next to the Rocky Mountains in importance are the Cascade, or Coast, Ranges, the outermost being sometimes called the Island Range because of the island off shore formed by some of the highest peaks of that part that is submerged. These parallel ranges are separated by broad, deep valleys of wonderful fertility. They are also connected by numerous cross ranges, which divide the valleys and render the surface of the region very complex. The most noted of these ranges are the Selkirk and the Gold (See Selkirk Mountains). The highest peaks in the Rocky Mountains exceed 10,500 ft. and the height in the Coast Ranges varies from 6000 to 9000 ft. The cross valleys are narrow and steep, but many of them are exceedingly productive. In the northern half of the province the valleys are broader and the mountains lower.

Lakes and Rivers. There are numerous lakes in the mountain valleys, some of them at great altitude. All are long, narrow and very deep and the water is clear and cold. The northeastern part of the province is drained by the Peace and the Liard rivers and their tributaries in the Mackenzie. The south-central part is drained by the Fraser, which flows into the Strait of Georgia, and the southeastern part by the Columbia. Other rivers of importance are the Skeena, the Stikine and the Thompson, which flow into the Pacific.

Scenery. British Columbia is a land of snow-capped mountains, many of whose sides are covered with glaciers, beautiful valleys, through which flow

rushing streams whose cataracts and cascades add to their charm, and of mountain lakes, whose exquisite settings beggar description. The region along the Canadian Pacific Railway has been described as "a score of Switzerlands, with loftier mountains, larger lakes, mightier glaciers and rivers and with a magnificent seaboard in addition."

"Lake Louise itself is one of the loveliest pictures, like a vision from a dream of enchantment, nestling like a jewel dropped from heaven; its blue waters glistening in a setting of flower-strewn grassy shores, sloping into the forest of tapering spruce and pines, above which loom huge giant precipices and frowning cliffs, with the black walls of Mt. Leroy rising beyond the valley, its ice-crowned peaks melting into the blue of the sky."

Climate. Along the coast the climate is much milder than that of other provinces of the same latitude. The temperature at Vancouver ranges from 37° to 63° F. This is due to the influence of the warm drift in the Pacific. As one goes inland the variation in temperature between summer and winter increases, but nowhere in the southern part of the province are the winters severe. The temperature varies with the altitude until the line of perpetual snow may be reached in ascending from a valley whose summers are hot and winters mild. In the northern half of the province the average temperature is lower, but the variation between summer and winter is less than farther inland. Along the coast in the south the rainfall is heavy, being about from 60 to 75 inches at Vancouver. The Coast Ranges condense the moisture from the ocean winds and their western slopes are covered with dense growths of forests and other vegetation, while upon the eastern slope irrigation may be necessary to successful agriculture. The upper currents pass over the lower summits of the Coast Ranges, and, having their moisture precipitated by the higher peaks of the Selkirks and the Rockies, cover these mountains with snow, which is the source of the glaciers on their slopes. In the northern part of the province the rainfall is about 40 inches. In some localities in the southeast irrigation is necessary.

Minerals and Mining. The mineral resources are of untold value, and since large areas are not yet explored, their extent is unknown. Gold is found along the beds of nearly all the streams and placer mining has been carried on for more than 50 years. The present yearly output of gold is about $5,000,000. There are also veins of gold-bearing quartz in the mountains, but they have not yet been worked. Silver occurs in combination with copper and lead, and in the reduction of these complex ores all three metals are obtained. British Columbia is the leading province of Canada in the production of copper. The most valuable mines for copper, silver and lead are in the Slocan division of West Kootenay and the Ft. Steele division of East Kootenay; and in the Rossland and Boundary districts. The province contains extensive deposits of iron ore, and coal is mined on Vancouver Island, in the Nicola Valley, and along the line of the Crowsnest Railway. There are also large coal measures in the Skeena region, the Semelkameen district and in the Queen Charlotte Islands.

Forests and Lumber. The forest areas of British Columbia are estimated at 31,250 sq. m. The coast is heavily timbered as far north as Alaska, and the valleys and western slopes of the mountains are clothed with dense forests of valuable timber. The trees are of unusual size, some of them reaching a height of 250 ft. and a trunk circumference at the base of 30 to 60 ft. The most valuable tree is the Douglas fir. North of parallel 51° yellow cedar, hemlock, spruce and cypress replace the Douglas fir and all are valuable timber trees. Lumbering is one of the important industries of the province, and the forests of British Columbia are a valuable source of supply for the lumber markets of Alberta and Saskatchewan, as well as those of San Francisco and other coast cities of the United States. There

are numerous sawmills throughout the province. The manufacture of wood pulp is also becoming an important industry. British Columbia supplies about one-third the lumber of the Dominion. The value of the cut for 1919 was over $30,000,000.

Fisheries. The fisheries exceed in value those of any other province in the Dominion. All rivers flowing into the Pacific contain an abundance of fish, and during the spawning season salt-water fish ascend these streams in incredible numbers. The leading branch of the industry is catching and canning salmon, which is chiefly carried on along the Fraser River. The salmon pack for 1911 was 948,965 cases. Halibut, herring, cod, trout and other varieties of fish are also taken in large quantities. Total value of the fisheries averages about $15,000,000.

Agriculture. The valleys and lower slopes of the mountains are covered with fertile soil, and the climate is one of the best in the world for agricultural purposes. Wheat, oats, barley and other grains, potatoes and vegetables of all kinds yield large returns to the husbandman. The valleys in the southern half of the province are suited to fruit growing, and apples, peaches, pears, cherries and small fruits of excellent quality are produced. In 1912 there were over 120,000 acres of orchards in the province, and the area is being rapidly extended each year. In the region of less rainfall stock raising is followed to a considerable extent, and dairying is becoming an important branch of animal husbandry. The province has great agricultural possibilities, which will doubtless be attained with the increase in population.

Transportation and Communication. The coast contains numerous fiords, some of which are excellent harbors, and Puget Sound is one of the greatest roadsteads in the world. The chief harbors are at Vancouver, Victoria and Prince Rupert. From these ports steamship lines extend to all important ports on the Pacific coast of North America, China, Japan and Australia. Most of the rivers flowing into the Pacific are navigable in the lower part of their course. The Canadian Pacific Railway crosses the southern part of the province, and its numerous branches provide this section with good railway facilities. The Grand Trunk Pacific is being constructed across the central part of the province to its Pacific terminus, Prince Rupert. The settled portions are well supplied with post offices, telegraphs and telephones.

Government. The chief executive is a lieutenant-governor, who is appointed by the governor-general of the Dominion for a term of five years. He is assisted by an Executive Council appointed by himself from the heads of departments of the provincial government. The Legislature consists of an Assembly of 42 members chosen by districts. The judges of the courts are appointed by the Dominion Parliament for life. Concerning matters pertaining strictly to British Columbia the provincial government is supreme, but its acts must conform to the constitution and the laws of the Dominion Parliament.

Education. There is an excellent system of public schools. The schools receive support from the government in proportion to the attendance and are conducted strictly upon a secular basis. High schools are found in the cities and larger towns, and there are numerous private schools.

Cities. The chief cities are Victoria, the capital; Vancouver, Nanaimo, New Westminster, Rossland and Nelson, each of which is described under its title.

History. It is thought by some that Sir Francis Drake sailed as far north as the Strait of Juan de Fuca in 1578-9. In 1592 this strait was entered by the Spaniard whose name it bears, but it was not until 1778 that the British Government began to explore the region; in that year Captain Cook received instructions to explore the coast. Vancouver followed in 1792 with a more complete survey. From that time until the discovery of gold in 1858 the region was under the control of the Hudson's Bay Company. In 1858 miners from California, having learned

of the discovery of gold on the Fraser River, entered the valley. Other discoveries followed with the usual influx of miners. The boundary dispute with the United States was adjusted in 1848 and the following year Vancouver Island was made an imperial colony, but British Columbia remained a separate government until 1866, when the two governments were united. After the formation of the Dominion in 1867 overtures were made to British Columbia to join the Confederation. This the provincial government finally agreed to do in 1871, on condition that a railway connecting British Columbia with the Eastern Provinces of Canada should be completed within ten years. This was agreed to by the Dominion Government, and British Columbia became a member of the Confederation in 1873. The railway was completed in 1886, since which date the province has advanced rapidly along all lines of industry.

British East Africa, a general name applied to the British possessions of East Africa, including the East Africa Protectorate, the Uganda Protectorate and the islands of Zanzibar and Pemba. It touches Egypt and Abyssinia on the n., the Italian Somaliland and the Indian Ocean on the e., German East Africa on the s. and the Congo on the w. Lake Victoria Nyanza, also, forms a part of the southern boundary, and Lake Albert Nyanza, a part of the western. Its entire area is about 200,000 sq. m. The people of the coast are largely Arabs; farther inland are the Bantu-speaking tribes and the Somalis, as well as some Asiatics and Europeans. The soil is fertile and much land is cultivated; wheat, cotton, corn, rice, tobacco, hemp and rubber are produced extensively, while dairy farming and sheep and ostrich raising are important industries. In 1907 slavery was abolished; schools and churches are increasing in number, and the country is rapidly developing. The Cape-to-Cairo Railway will eventually traverse it from north to south. The population is estimated at 4,038,000.

British Hondu'ras, or **Belize,** *Bel eez'*, a crownland of the British Empire, lying on the east coast of Central America. It is bounded on the n. by Yucatan, on the e. by the Caribbean Sea and on the s. and w. by Guatemala. The coastal plains are low and swampy, and there the climate is moist and warm. In the western part there are low mountains, where logwood and mahogany grow in great forests. These and sugar constitute the chief exports. The colony is presided over by a governor, and an executive and a legislative assembly. Belize is the capital city. The area of the colony is 8598 sq. m. Population, 40,500.

British Isles. See GREAT BRITAIN.

British Museum, a national museum located in London and founded in 1753 by Sir Hans Sloane. Its first home was the Montague House, and it was opened to the public in 1759. This house soon became too small to accommodate the collections and in 1823 the building in Great Russell Street was decided upon, but it was not completed until 1847. Ten years later a new library costing $750,000 was completed. This library contains over 45 m. of shelves and the largest reading room in the world. The building also houses next to the largest library in the world.

The museum again outgrew its quarters, and in 1881 the departments of mineralogy, geology, zoology and botany were transferred to a new building erected near South Kensington at a cost of $2,000,000. The original museum contains extensive collections of rare manuscripts and works of art, historic relics, coins, medallions and other objects of great interest to scholars, being one of the richest depositories of such material in the world. The museum at Kensington is of great service to those interested in the study of the various branches of natural science.

British Somaliland, *So mah' le land"*, a British possession in East Africa on the Gulf of Aden. It exports gums, hides, ostrich plumes, cattle and sheep. Transportation is entirely by means of camels. The chief towns are Zeila, Bulhar and Berbera, none of which is of

great size except in the trading season. British Somaliland is under the charge of the British Colonial Office, and its affairs are administered by a commissioner who is also commander-in-chief of the army. Its area is about 68,000 sq. m.; its population is 300,000, most of whom are Mohammedans.

British Ther'mal Unit. See CALORIM'ETRY.

Brit'tany, or **Bretagne,** *Bre tane',* a peninsula projecting from off the northwestern coast of France, between the Bay of Biscay on the south and the English Channel on the north. The coast, rising in lofty, rugged cliffs, contains the ports of Saint-Malo, Brest, Nantes, Saint-Brieuc, Quimper and Lorient. Where the land is cultivated it yields abundant crops, but on the whole the agricultural methods are primitive. In the southwest the country abounds in legends and quaint superstitions, and the Celtic language, rich in folk lore and its individual literature, is still retained. The Bretons belong to the Celtic, or Alpine, peoples, and are generally known by their rounded faces, brown eyes and thick-set figures. See FRANCE.

Brock, Sir Isaac (1769-1812), a British soldier and administrator. Becoming lieutenant in 1790, he served in the West Indies, in Holland and at the Battle of Copenhagen, after which he came to Quebec, where from 1806 to 1810 he had charge of the garrison. In the latter year he took command of the troops in Upper Canada, and soon became provisional lieutenant-governor. During the War of 1812, Aug. 16, 1812, he received the surrender of General Hull with his entire army at Detroit. He was killed in the engagement at Queenstown on Oct. 13, where the Provincial Legislature erected a monument to his memory. There is also a memorial to him at St. Paul's Cathedral, London. He was one of the ablest and most efficient soldiers and administrators connected with Canadian affairs.

Brock'ton, Mass., a city of Plymouth Co., 20 m. s. of Boston, on the New York, New Haven & Hartford Railroad. Interurban electric lines connect with near-by towns and cities. The city is the industrial center of a large population, and contains the villages of Campello and Montello. Surrounding it are the towns of East and West Bridgewater, Easton, North Easton, Stoughton, Avon, Randolph, Holbrook, Abington and Whitman. Brockton is one of the largest boot- and shoe-manufacturing centers in the world, containing a large number of factories. It leads the world in the manufacture of men's high-grade shoes. There are also manufactories of lasts, blacking, paper, wood packing boxes, rubber goods, tools, motor cycles, shoe machinery and supplies, nails and spikes, and mechanics' tools. There is a public library with a large number of volumes. Brockton was North Bridgewater until 1874 and was chartered as a city in 1881. Brockton was the first city in Massachusetts to abolish the grade crossings within its limits. Population in 1920, 66,254.

Brock'ville, a village of Canada in the Province of Ontario, on the St. Lawrence River and the Grand Trunk, Canadian Pacific and other railways, 251 m. n.e. of Toronto. It has irregular steamer connection with other lake and river ports. The village is a county seat and a manufacturing center, and has good fishing facilities. The leading industrial establishments include machine works, a brewery, a foundry, builders' and woodwork factories and manufactories of carriages, agricultural implements and hats. The village was named after Gen. Isaac Brock. Population in 1919, about 11,000.

Brodeur, Louis Philippe (1862-), a Canadian lawyer and statesman, born in the Province of Quebec and educated at Laval University. He practices law in Montreal and, besides writing for the press, has edited the Liberal organ, *Le Soir.* Since 1891 he has sat for Rouville as a Liberal, being deputy speaker and chairman of committees from 1896 to 1901, when he was elected speaker. Later, in Laurier's cabinet, he was minister of inland revenue, subsequently being appointed minister of marine and fisheries. In June, 1910, he became the

first minister of naval affairs and in August of the following year was appointed a judge of the Supreme Court of Canada.

Bromine, *Bro'min,* a reddish-brown, liquid element discovered by Balard in 1826, in the residue left by the evaporation of sea water. Bromine, like chlorine, which it closely resembles, is not found free in nature, but occurs most frequently in combination with sodium and magnesium in salt wells, mineral springs and sea water. The chief sources of bromine in the United States are the salt wells of Ohio, West Virginia and Michigan. In Michigan the sodium bromide is pumped up with the salt and treated with chlorine to free the bromine. This method is also in use at the salt wells of Germany.

Like chlorine, bromine produces severe burns upon the skin, and its vapor affects the linings of the nose and throat unpleasantly. It acts as a bleach on vegetable dyes, but is not often used, as its action is very slow. Its chief use is in medicine and as a bromide of silver in photography on the sensitive plates. Bromine is the only nonmetal which is liquid at ordinary temperature.

Bronchial, *Bron' ki al,* **Tubes,** sections of the air passage lying within the lungs. They are continuations of the right and left bronchi, which unite to form the windpipe. They are lined with mucous membrane, supported by layers of muscular and connective tissues. Imperfect rings of cartilage encircle them at intervals and keep the tubes open. The inner surface of the tubes is covered with cilia, minute hairlike structures, whose constant motion sweeps upward towards the tubes leading to the throat the secretion which bathes the walls. See Bronchitis; Trachea.

Bronchitis, *Bron ki' tis,* inflammation of the mucous membrane lining the bronchi, or bronchial tubes. It may be either acute or chronic. Acute bronchitis is "cold in the chest," and is common in young children, old people or persons whose occupations necessitate the inhalation of fumes or dust. It is aggravated by overheated rooms and bad air. The chronic form commonly occurs in middle life or old age, and often accompanies diseases of the heart, kidneys or liver. The symptoms of either form may be feverish cold, headache, general debility and coughing, sometimes in paroxysms, tightness in the chest and a discharge of yellowish mucous from the air passages. The disease is not ordinarily dangerous and can be successfully treated with various home remedies. See Bronchial Tubes.

Bron'të, Charlotte (1816-1855), an English novelist, the oldest of the three "Brontë sisters," born in Thornton. In 1820 the family removed to Haworth. Growing up on the stern and solemn Yorkshire moors, the girls, Charlotte, Emily and Anne, found life pitiably stern and repellent. The mother's untimely death, an unsympathetic father, a prim and exacting aunt, the weak and drunken only brother,—all combined to make the life of the girls, in the poverty-stricken little Haworth parsonage, the grim and forbidding thing that the exceeding pathos of their protests and the outbursts of grief and passion in their writings reveal. To prepare themselves for teaching Charlotte and Emily went to Brussels in 1842, but on their return they found school keeping wearisome in its drudgery, and turned to writing. They published under the names Currer, Ellis and Acton Bell, but the first slim volume of poetry (1846) attracted slight attention. Their novels met with better success, *Wuthering Heights,* by Emily, and *Jane Eyre, Shirley* and *Villette,* by Charlotte, becoming deservedly popular. The poems by Emily, *Old Stoic* and *Last Lines,* as well as her novel, have a haunting power, an indefinable charm. In *Jane Eyre,* Charlotte Brontë struck a new vein of realism, mingled with a romantic manner of treatment, and the homely tale met with immediate and enthusiastic acclaim. In 1854 Charlotte became the wife of the Rev. Arthur Nicholls. Mrs. Gaskell's *Life of Charlotte Brontë* throws interesting light on the life and character of the Brontë sisters.

Bronze, *Bronz,* an alloy of copper and tin, in variable proportions, sometimes with the addition of lead, zinc, silver or aluminum to suit different purposes. Gun metal is nine parts copper and one part zinc. Bell metal generally is three parts copper to one part tin. Statuary bronze is eight parts copper to two parts tin. Aluminum bronze is composed of copper and aluminum. Manganese bronze is a composition of the ordinary bronze with manganese, and iron is sometimes added. See ALLOY; ALUMINUM; COPPER.

Brook Farm, the name of a tract of land in West Roxbury, Mass., where from 1841 to 1847 a communistic experiment was attempted. Originated by George Ripley, it was designed to put to practical test some of the theories of the New England Transcendentalists. All members of the community labored a certain period of the day, each person receiving his share of the products from a common stock. Among the enterprises that developed were a school and a publication to which Lowell, Whittier, George W. Curtis and Horace Greeley contributed. Financial difficulties led to the abandonment of the undertaking in 1847. Hawthorne and Charles A. Dana were for a time regular members of the community, and among its visitors for longer or shorter periods were Emerson, Amos Bronson Alcott, Theodore Parker, William H. Channing and Margaret Fuller. The land is now the site of a Lutheran orphan asylum. See TRANSCENDENTALISM.

Brook'line", Mass., a town of Norfolk Co., 3 m. s.w. of Boston, directly south of the Back Bay district, on an arm of the Charles River and on the Boston & Albany and other railroads. The town has an area of over six square miles. It is connected with Boston and other cities by electric railroads. Brookline is one of the wealthiest of the suburbs of Boston and contains many charming country seats and palatial homes, surrounded by beautiful parks and gardens. The villages of Cottage Farm, Longwood and Reservoir Station, or Chestnut Hill, are within the corporate limits of the town. It is connected with Boston Common by boulevards of the Metropolitan Park System. There is a fine public library. The chief industries are the manufacture of electrical appliances and screens of various kinds. The place was first settled in 1635 and known as Muddy River until 1705, when it was incorporated as a town and the name changed to Brookline. Population in 1920, 37,748.

Brook Ouzel, *Oo' z'l.* See OUZEL.

Brooklyn, *Brook' lin,* **N. Y.,** the largest borough of New York City, coextensive with Kings Co., separated from the borough of Manhattan, the old city of New York, by the East River, and on the Long Island Railroad. About 50 coastwise and trans-Atlantic steamship lines connect the city with various ports of the world. Subway lines connect with the subway system of New York. The south shore of the borough has various summer pleasure resorts. The manufacturing and shipping districts lie principally along the west water front. The Brooklyn navy yard, occupying 144 acres, is the principal navy yard of the United States. The Erie Basin contains large dry docks and is occupied by piers and warehouses. Brooklyn is one of the great manufacturing centers of the country and has many important branches of industry. The sugar-refining interests are of vast importance. Coffee and spice milling is another great industry, and there are extensive manufactories of soft drinks, glass and porcelain, chemicals, paints, cordage, hosiery and knit goods, cigars and machine-shop products. Grain is the chief commodity, and the grain elevators have a storage capacity of about 20,000,000 bushels.

The most noteworthy institutions include the Brooklyn Institute of Arts and Sciences, the Polyclinic Institute, Pratt Institute and Packer Collegiate Institute. The city is well provided with benevolent and charitable institutions. There are many beautiful parks, including Prospect Park of 516 acres, parkways and boulevards. Brooklyn is known as a residential city, the business interests of a con-

siderable portion of its inhabitants being in New York. There are many large hotels, handsome residences and apartment houses. Brooklyn, or Columbia Heights, one of the oldest residential parts of the city, commands a magnificent view of the harbor and bay.

The first settlement was made in 1636, when Dutch farmers located on the shores of Gowanus Bay. In 1654 the municipal boundaries of Brooklyn were enlarged. Williamsburg, which had been incorporated as a city in 1851, was consolidated in 1855. On Jan. 1, 1898, the city became a borough of New York City (See NEW YORK, CITY OF). Population in 1920, U. S. Census, 2,018,356.

Brooks, Phillips (1835-1893), an American clergyman, lecturer and author, a native of Boston, Mass. A descendant of John Cotton and the family of his own name, he inherited the best of the religious traditions of New England. He was graduated from Harvard College and the Episcopal Theological Seminary at Alexandria, Va. He was ordained to the Protestant Episcopal ministry in 1859, and became rector of the Church of the Advent, in Philadelphia. Two years later he became rector of the Holy Trinity Church of that city. From 1869 to 1891 he was rector of Trinity Church, Boston. In 1891 he was raised to the bishopric of Massachusetts. Bishop Phillips Brooks was a man of fine physical presence, aglow with great spiritual power. This, in part, accounts for his almost marvelous force as a pulpit orator and the torrential rate of his impassioned speech. He was universally honored and loved in America and abroad by the adherents of all denominations.

Broom, a European shrub of the Pulse, or Pea, Family, introduced into the United States as an ornamental park and lawn plant and grown successfully in warmer parts of the United States. It is a graceful shrub with straight, slender branches which are dark green in color. The leaves are made up of three oval leaflets of which those near the end of the branches are larger than those at the base. The flowers are large, yellow blossoms borne singly on stems which droop from the axils of the leafstalks. They are butterfly-shaped, much like those of the sweet pea or common vetch.

Broom is exceedingly common in Europe, especially in the Mediterranean region, where many species of it are known. It is there used in tanning and dyeing and its fibers are used for making coarse cloth. The tops and seeds are used medicinally and the branches are made into twig brushes called besoms or brooms. The tree broom furnishes a lumber valued in cabinetwork. A few species of broom are known in northern Europe and all are decidedly ornamental.

Broom, a household implement for sweeping floors. It consists of a handle about four feet long, attached to which by wire or twine is a brush, composed generally of broom-corn straws sewed together flatwise. Smaller brooms of similar shape and materials are known as whisk brooms, and are used for dusting clothes. Formerly twigs and fine splints bound together composed a broom. For many years brooms were made only by hand, and the broom maker was often met with in large communities. Machinery has taken his place, and now the annual output of brooms amounts to nearly $20,000,000. See BRUSH.

Broom Corn, a member of the Grass Family and related to the sorghums from which molasses and sugar are made. On account of the long rays which surround the flower clusters the plant is extensively cultivated in Oklahoma, Illinois and Kansas for its use in making brooms, whisk brooms and brushes. Broom corn has a thick, pithy stalk from six to ten feet in height, and long, pointed leaves which at the bases are rough with hairs. These leaves enclose the stalk in the same manner as do those of all species of corn. The flowers grow in large, much-branched clusters surrounded by leathery sheaths. In making brooms the flower heads are cut while the seeds are yet green; then the seeds are removed and the brush dried. The United States exports annually quantities of the dried

brush to Europe for the manufacture of brooms.

Brotherhood of St. Andrew, a religious organization for men founded by St. James Episcopal Church, Chicago, in 1883, for the "spread of Christ's Kingdom among young men." There are national organizations in the United States, Canada, England, Scotland, Australia, Germany, China, Japan and in the West Indies and the countries of South America. The Brotherhood is divided into senior and junior departments, and in the United States maintains a number of field secretaries. There are over 1500 chapters and the membership exceeds 15,000.

Brother Jon'athan, a term which stands for broad-minded, successful Americanism, and applied to the people of the United States just as the name "Uncle Sam" is used to typify the government. The name originated with General Washington when he was in command of the Revolutionary armies, who had among his counselors Jonathan Trumbull, then governor of Connecticut. During a discussion of ways and means Washington suggested that "Brother Jonathan's" opinion be sought. This was done with such gratifying results that the story spread to the rank and file of the army and the answer to any request thereafter was, "Ask Brother Jonathan."

Brough, *Broo,* **John** (1811-1865), an American journalist and public man, born in Marietta, Ohio, and educated at the state university. He learned the printer's trade in the office of the *Marietta Gazette,* and subsequently edited influential Democratic papers in Lancaster and in Cincinnati, meanwhile winning a reputation as an orator. He held several state offices, served on the commission which adjusted the boundary between Ohio and Virginia and, in 1864, became governor as the Republic-Union candidate, being famed, because of his efficiency in this capacity, as one of the great "war governors."

Brougham, *Broo' am,* **Henry,** BARON BROUGHAM AND VAUX (1778-1868), a British statesman, born in Edinburgh, Scotland. He was educated at the High School and at the University of Edinburgh. At the age of 18 years he wrote some papers on mathematics that were published in the *Transactions* of the Royal Society. In 1800 he was admitted to the bar of Scotland and in 1808 he became member of the English bar. In 1810 he entered Parliament, where he won distinction by his defense of Queen Caroline, his opposition to the slave trade and his efforts to extend education and to reform the laws. He was an orator of great power.

Brown, Benjamin Gratz (1826-1885), United States senator and governor of Missouri, born at Lexington, Ky. He graduated at Yale in 1847, and in 1850 began the practice of law in St. Louis. From 1852 to 1858 he was a member of the Missouri Legislature, and published a newspaper, the *Missouri Democrat.* During the Civil War he served in the Union army, attaining the rank of brigadier-general of volunteers. From 1863 to 1867 he was United States senator, and in 1871 was elected governor of Missouri. In 1872 he was candidate for the vice-presidency of the United States on the ticket with Horace Greeley.

Brown, Charles Brockden (1771-1810), an American novelist and editor, born in Philadelphia, Pa. Before Cooper, he was the most representative American novelist, and in his stories he makes free use of the local color afforded by early frontier life; his work, however, remains unreal and improbable, though suggestive of genius here and there. He wrote *The Dialogue of Alcuin, Wieland, or the Transformation, Arthur Mervyn, Edgar Huntley* and *Clara Howard.* His work in connection with periodicals and political writings is of less permanent interest and value.

Brown, Elmer Ellsworth (1861-), an American educator, born in New York, educated in the Illinois State Normal University, the University of Michigan and in Germany. After some public school experience, he became in 1891 assistant professor of education at the University of Michigan. In 1893 he was

chosen to head the department of pedagogy in the University of California. Succeeding William T. Harris as commissioner of education for the United States in 1906, Dr. Brown served the country for five years in that capacity. In 1911 he resigned to become chancellor of the New York University. He has written *Democracy in the Universities* (1891); *Origin of American State Universities, The Making of Our Middle Schools* and *Secondary Education.*

Brown, Henry Kirke (1814-1886), an American sculptor, born at Leyden, Mass. At an early age he attempted portraits, studied painting under Chester Harding, and in 1842 went to Italy, where he remained four years. His equestrian statues are deserving of the highest praise, those of Gen. Winfield Scott, in Washington, D. C., and George Washington, in Union Square, New York, being excellent examples.

Brown, Jacob (1775-1828), an American soldier. Removing from Pennsylvania to New York, he finally became military secretary to Alexander Hamilton. Later he entered the state militia, and in the War of 1812, while defending the frontier, so distinguished himself at Ogdensburg and Sackett's Harbor that he became brigadier-general in the regular army. By 1814 he was commander of the Northern Department, being conspicuous at Chippewa, July 5, and at Lundy's Lane, July 25. After 1821 he was general-in-chief of the army.

Brown, John (1800-1859), an American abolitionist, the originator of the Harper's Ferry insurrection, born in Torrington, Conn. He was of *Mayflower* descent. Brown early removed to Ohio, where he was successively a tanner and a dealer in wool. Later he visited Europe on business and in 1855 emigrated to Kansas, where he was an anti-slavery champion and, during the border warfare carried on in Kansas and Missouri, gained renown by his victories at Pottawatomie and Osawatomie. As early as 1839 Brown had conceived the idea of being a slave liberator; but his first definite steps in this direction were not taken until 1859. That summer, under the name of Smith, he hired a farm near Harper's Ferry, Va., where he was joined by about 25 followers. Having meanwhile gathered a large store of arms, they seized the government armory and the railway bridge at Harper's Ferry on the night of Oct. 16, 1859, and the following morning captured many prominent men of the town, including Colonel Washington, who lived near by and whose slaves they liberated. But Brown's mad attempt then turned into failure. Slaves of the surrounding country did not rise and flock to his standard as he had anticipated; instead, the Virginia militia soon gathered, and when they were joined by Col. Robert E. Lee with 90 marines and two pieces of artillery, the liberators were forced from the engine house, where they had taken a determined stand, and were captured. At Charlestown, on Oct. 27, Brown was found guilty of treason and murder, and he was there hanged on Dec. 2. The incident excited great sympathy throughout the North and made the South more tenacious of what it considered its rights. Brown's attack upon Harper's Ferry is considered as one of the significant events leading to the Civil War.

Brown, John (1810-1882), a Scottish physician and author, born in Biggar. He studied in the University of Edinburgh and practiced as a physician in that city. He published little, firmly believing that no author should write until he had something to say and was ready to say it right. Humor and winning gentleness are characteristics of his work. He wrote *Rab and His Friends, Leisure Hours* and *Marjorie Fleming.*

Brown, Joseph Emerson (1821-1894), an American lawyer and governor, born in South Carolina. He removed to Georgia, was elected to the State Senate in 1849 and was Democratic governor from 1857 to 1863. During the Civil War he proved himself a strong supporter of the Confederacy, raising an army of 100,000 old men and boys to oppose Sherman's march. He

accepted the result of the struggle, however, with prompt good judgment. In 1868 he was appointed chief justice of the State Supreme Court, and in 1880 was elected to the United States Senate.

Browne, *Brown,* **Charles Farrar** (1834-1867), better known by the pseudonym Artemus Ward, an American humorist, born in Maine. He began his career while setting type for the Boston *Carpet-Bag,* by contributing jokes to its columns. Subsequently he wrote for various journals in Cleveland and New York; also, in 1866 and 1867, for the London *Punch.* Finding newspaper work monotonous, he entered the lecture field, where his broad humor, enhanced by his ungainly figure, made him very popular as a writer and lecturer both in England and America. His works include *Artemus Ward: His Book; Artemus Ward: His Travels Among the Mormons;* and *Artemus Ward in London.*

Browne, Hablot Knight (1815-1882), an English caricaturist and illustrator better known by his pen name of Phiz. In 1835 he came into prominence through his illustrations for *Pickwick Papers.* Subsequently he illustrated other novels of Dickens and those of Ainsworth, Lever and Scott, besides contributing many comic drawings to the illustrated serials of the time. He was one of the prominent members of the staff of *Punch.* His work is particularly noteworthy in representing just what the reader wishes to see.

Brown'ie, a sprite supposed to haunt fields and houses in search of ways in which he might slyly help good folk perform their tasks. He was frequently inclined to play mischievous tricks, but these were more than made up for by his good deeds. The brownies are of Scottish origin, and there many tales are told of the doings of this fairylike folk. Brownies have been introduced into child literature throughout the world.

Brown'ing, Elizabeth Barrett (1806-1861), an English poet, born near Durham. She was of feeble health and suffered from chronic invalidism the greater part of her early life. Her meeting with Robert Browning, the poet, occurred as a result of her allusion to his poetry in her *Lady Geraldine's Courtship;* their marriage took place in 1846, secretly, because of her father's objections; but though the old home was not open to her after this act, she never found cause to regret the step, for until her death their union was one of almost perfect happiness. Her health improved, and some of her most exquisite verse records the ennobling influence of this blissful love on her sensitive soul. The emotional and lyrical element predominates in her poetry; but neither is it lacking in depth. Among her works are *The Cry of the Children,* the inimitable *Sonnets from the Portuguese, Casa Guidi Windows, Aurora Leigh, The Dead Pan, The Rhyme of the Duchess May* and the collection *Poems before Congress.*

Browning, Robert (1812-1889), an English poet, born in Camberwell, London. From his father, an eminent classical scholar, he inherited a strong and vigorous constitution; from his mother, a lovely and talented woman, his passion for music. His childhood was happy and his education was obtained through home instruction, private tutoring and a short course at University College, London. He traveled on the Continent, and, after the publication of *Pauline,* his first book, in 1833, he spent a winter in Russia, went to Italy and then returned to London, where he lived until his marriage with Elizabeth Barrett in 1846. For 15 years their life, spent chiefly in Italy, was full of happiness and contentment; when Mrs. Browning died, Browning returned to London and a period of great literary activity followed. Though he again visited Italy and though reconciled to his loss, he never went to Florence after his wife's death there.

Browning early admired Byron, Keats and Shelley, especially Shelley, who had a marked influence on his own poetry. Tennyson and he were warm friends, mutually sharing the growing admiration of their contemporaries. Browning's poetry is essentially dramatic, obscure, perhaps, but that only because of the

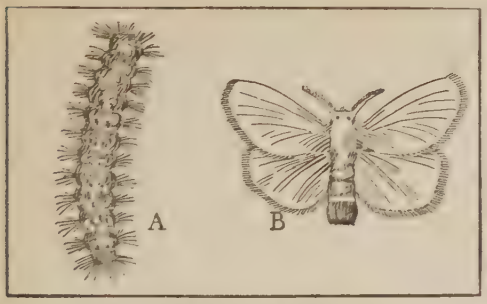
very fullness of his thought and the rapidity with which his mind worked. He is psychological, interested preeminently in the human soul, but he develops his ideas concretely and together with his gift of analysis he reveals great learning, a rich vein of humor and a vivid power of description. Among all forms which he adopted he excelled in the dramatic monologue, and made it distinctly his own. His verse is rugged, unmelodious at times, but again he writes lyrics of wondrous and haunting melody. However, he is the prophet, rather than the poet. And few writers are as invigorating, as inspired with faith in the eternal goodness of things, as morally wholesome as is he; it is as a singer of hope, of optimism and of cheer that he stands supreme. Among his works are *Bells and Pomegranates,* a series containing *Pippa Passes, Colombe's Birthday* and *A Blot in the 'Scutcheon; Dramatic Lyrics and Romances, Christmas Eve and Easter Day, Men and Women, Dramatis Personæ, The Ring and the Book* and *Asolando.* Single poems of marvelous power, beauty or charm embrace *Rabbi Ben Ezra, Grammarian's Funeral, Saul, Prospice, A Death in the Desert, Fra Lippo Lippi, Andrea del Sarto, James Lee's Wife, My Last Duchess, Abt Volger, The Pied Piper of Hamelin, Cavalier Tunes* and *The Last Ride Together.*

Brown'son, Orestes A. (1803-1876), an American philosopher, born at Stockbridge, Vt. He was brought up by Presbyterian guardians and taught the rigid faith of Puritanism. In 1822 he joined the Presbyterian Church, but, being unwilling to accept the doctrine of predestination, in 1824 became a Universalist. In 1826 he was ordained a minister of that faith and worked as a preacher and writer. Having adopted still more liberal opinions, in 1829 Brownson became connected with the *Free Enquirer* of New York, and in this paper attacked marriage, property and religion. During this time also, he had taken up the cause of the working men. Finding that he could not aid them without the help of religion, in 1831 he left the *Free Enquirer* and became an independent minister. In the following year he joined the Unitarians. Brownson began the Boston *Quarterly Review* in 1838, which later was merged with the *Democratic Review* of New York. In this periodical he wrote philosophical, literary and political essays. His independence in politics brought upon him the ill will of the Democratic Party, of which he was a member.

Brownson joined the Catholic Church in 1844 and nobly defended the Catholics who were so violently attacked during the middle of the 19th century. In this year also he began *Brownson's Quarterly Review,* in which many of his articles appeared. Even as a Catholic he was restless in his religious beliefs, and many spoke of him as a liberal Catholic, indicating that he did not accept the Catholic faith in its entirety. During the Civil War, in which he lost two sons, his *Review* was discontinued, but it was renewed in 1873 and was published until the end of the year 1875. His later writings appeared in the *Ave Maria, Catholic World* and the *American Catholic Quarterly Review.* He is remembered as a philosopher, essayist and editor, and as an earnest, energetic Catholic layman.

Brownsville, Tex., a city, port of entry and the county seat of Cameron Co., on the Rio Grande River opposite Matamoros, Mex., and on the St. Louis, Brownsville & Mexico and other railroads. The city is the commercial and distributing center of a rich agricultural region and an important market for rice, vegetables, fruit, sugar cane and live stock. Among the noteworthy features of the place are the United States Custom House, the Cameron County Courthouse and a Roman Catholic cathedral and convent. Settled in 1848, Brownsville was incorporated in 1853 and is administered under a charter of 1875. Near the city was fought, in 1846, the Battle of Resaca de la Palma, and in 1859 the town was taken by Mexican raiders. Population in 1920, U. S. Census, 11,791.

Brown-Tail Moth, a moth of the Tussock Moth Family of the order Lepidoptera. It should be well known because the caterpillar is extremely destructive to fruit and shade trees. The adult moth is easily recognized because



BROWN-TAIL MOTH

of the thick brush of orange-brown hairs at the extremity of the body. Otherwise the moth is practically pure white, though occasionally black dots may be seen upon the wings. The caterpillar, which is the moth in its larval stage, is about two-thirds of an inch long and has a wavy line of light spots on each side of its back and two red dots near the extremity. There are sometimes orange-colored patches as well. Groups of long, barbed hairs extend from the sides and intermingle with the shorter velvety coat. The caterpillars that hibernate are darker, with reddish spots. When ready to go into the pupal stage, several of the caterpillars together spin a web, each including its own cocoon therein. The caterpillars are not only destructive, but are extremely annoying because the long hairs upon the back exude a poisonous secretion which causes a painful rash. Since these hairs loosen and fly about, they often are the source of serious trouble. The illustration shows the larva, A, and the moth, B.

The brown-tail moth is extremely destructive to the foliage of park and forest trees. It can be most easily controlled by the destruction of the nests in the late fall or winter. Infested trees should be sprayed with a solution of arsenate of lead, but the older caterpillars need a much stronger solution (five pounds to a gallon of water) than do the younger ones. The United States Department of Agriculture has published complete directions for the identification and extermination of this moth, and these can be obtained without expense by application to the secretary. See INSECTICIDE.

Brown Thrasher, a bird of the Mocking Bird Family. The brown thrasher is larger than the robin (11 inches). It is rufous, or reddish-brown, above, and white, streaked with dark brown below; the throat is white and there are two short, white bands on the wings. The bill is long and curved and the tail is very long. The nest is usually built in low, thorny vines and bushes, and is a

BROWN THRASHER

bulky structure made of sticks, rootlets and leaves, and lined with horsehair and rootlets. Three to five reddish-brown-spotted eggs are laid. Though frequently called a thrush, this bird is allied to the wrens.

Brown University, at Providence, R. I. (1764). Chartered as Rhode Island College, the institution was opened at

Warren in 1765. It was removed to Providence in 1770 and took its present name in 1804. A Women's College, founded in 1891, was accepted by the trustees in 1897 as a separate department known as the Women's College in Brown University. The University has normally about 125 graduate students and about 750 undergraduates; in the Women's College there are about 250 students. Courses are offered leading to the degree of Bachelor of Arts, Bachelor of Philosophy, or Bachelor of Education; Bachelor of Science in Civil, Mechanical, or Electrical Engineering; Master of Arts, Master of Science, Doctor of Philosophy, and Doctor of Public Health.

Bruce, Robert (1274-1329), King of Scotland, was a descendant of Robert De Brus, who came into England with William the Conqueror. In 1296 Robert Bruce swore allegiance to Edward I of England, but in 1306 he began war with England by slaying a nephew of Baliol, who was a rival for the Scottish throne, favored by Edward I. Bruce was crowned at Scone, and after many defeats the tide of war turned in his favor in 1307, when he defeated the Earl of Pembroke at Loudon Hill. After the death of Edward I, the country was easily won, and in 1310 the Scottish clergy recognized Bruce as King.

Bruno, Giordano (1548-1603), a renowned Italian scholar and reformer. As a boy, his knowledge of science, mathematics and the classics was remarkable. He joined the Dominican Order and for thirteen years studied in monastic seclusion. He then abandoned the order and began a life of wandering in Europe,—France, England, and Germany,—writing, lecturing and teaching, ardently supporting the new learning ushering in the modern age. His activity excited the hostility of the Inquisition, he was arrested, confined in a dungeon for six years, then burned to death in a public square in Rome. In 1889 a statue was erected on the place of execution to commemorate his life work for intellectual and religious freedom.

Brunelleschi, *Broo"nel les' ke,* **Filippo** (1379-1446), the founder of Renaissance architecture, was born at Florence. First a goldsmith, then a sculptor, he finally devoted himself to architecture; and after studies in Rome, he returned to Florence and set about reviving the Roman style of building of classic times. His first important work was the Dome of the Duomo at Florence, the greatest engineering feat of the time in Italy. Following this beautiful masterpiece were numerous buildings, including chapels, cloisters and palaces, among them the Pitti Palace, the most impressive of Italian palaces. The greatest monument to his genius is the Pazzi Chapel of the Church of Santa Croce at Florence.

Brunhild, *Broon' hilt.* See NIBELUNGENLIED, *Ne' be loong" en leet".*

Brunswick, *Brunz'wik,* a state in the northern part of Germany, bounded mainly by the provinces of Hanover, Saxony and Westphalia. The total area is 1418 sq. m. The Harz Mountains in the southeast rise to an altitude of over 3000 ft.; the territory as a whole forms the basin of the Weser. Due to the productive soil, agriculture has long been the leading occupation, and the principal products include vegetables, cereals, potatoes, sugar beets and hay. The chief minerals are copper, iron, lignite, asphalt and lead. The manufactories consist of sugar mills, cigar and cigarette factories, refineries and chemical works. Population, about 486,000.

Brunswick, Ga., a city, port of entry and the county seat of Glynn Co., 68 m. s.w. of Savannah, on St. Simon's Sound, 8 m. from the Atlantic Ocean. Railroads entering the city are the Southern, the Plant System, the Atlantic & Birmingham, the Atlantic Coast Line and others. The harbor is a fine one, and steamships ply between this and other ports on the Atlantic seaboard, including New York and Boston. Among the exports are cotton, turpentine, pine lumber, crossties, tar, rosin and phosphates. The oyster fisheries are important; and the canning of oysters and vegetables constitutes, with truck farming, the most important industrial activity after shipping.

Brunswick is a delightful health resort in both summer and winter. Near-by features of interest are Jekyl Island (called the "millionaires' resort"), owned by a New York pleasure club; Cumberland Island, the burial place of "Light Horse Harry" Lee; St. Simon's Island; the Shell Boulevard, nine miles in length; and a 100-foot lighthouse. The principal buildings are the United States Government Building, city hall and Oglethorpe Hotel. Brunswick was settled in 1735 by James Oglethorpe; it is governed under a revised charter of 1900. Population in 1920, U. S. Census, 14,413.

Brush, an instrument made of bristles, wire or fiber set in a back or handle and used for various purposes. Brushes used for cleaning have stiff fiber and are made of bristles, wire or whalebone, or palm fiber. Soft or flexible brushes are made of the hair of the camel, the badger, the sable, the goat and other animals. Brushes of this class are usually attached to vertical handles and are used for painting and smoothing. Large brushes are made by boring small holes at regular intervals in a piece of wood, inserting the fiber in these holes and fastening it by wire. A finished piece of wood or other material is then glued, the first piece forming the back and usually the handle. The fibers are then cut to an equal length. See BROOM.

Brush, George De Forest (1855-), an American figure and portrait painter, born in Shelbyville, Tenn. He studied under Gérôme in Paris, and, returning to America, made a study of Indian life, which he portrayed with great truth and poetry and a keen appreciation of the significant. His *Sculptor and the King* and *The Silence Broken* deal not with the obvious and external life of the Indian, but with his inner life and thought. His more recent work has been confined to figure painting, in which he depicts the mother and child in the manner of the Italian Renaissance masters. He has received medals at every recent international exposition, is a member of the National Academy of Design and of the Society of American Artists. His later works include *Mother and Child, The Artist, Mother Reading to Children, A Family Group* and *A Portrait.*

Brush Turkey, or **Mound Bird,** a bird of the same order as the domestic fowl. The brush turkey is about the size of a domestic turkey. The colors are dark, without spots or markings. The neck has a wattle of lighter color. These birds are remarkable for the huge nest they make. Several birds combine their efforts, gather leaves, grass, dirt, etc., and form an oval-shaped heap or mound, sometimes 15 ft. high and 60 ft. in diameter. In this mound several females deposit their eggs, which are allowed to hatch by the heat of the mass. The eggs are very large, over three inches long, and the young are fully feathered when hatched. These birds are confined to New Guinea and the adjacent islands, and are much sought after for food.

Brussels, *Brus' elz,* the capital of Belgium and the Province of Bravant, situated on the Senne River. It is divided into the upper and the lower town. In the upper part are the modern quarters, where French is chiefly spoken; the lower, or business portion, retains its Flemish characteristics. Much attention is given to the artistic improvement of the city as well as to municipal control of its various works. The avenues and squares are beautiful and the parks magnificent. The important public buildings include the king's palace, the Cathedral of Ste. Gudule, Notre Dame des Victories, Notre Dame de Finistère, St. Jacques sur Caudenburg, the Hôtel de Ville, the Palace of the Nation, the Palace of Justice, an academy of science and the fine arts, a conservatory of music, a picture gallery with a rich collection of Flemish art, the Royal Library containing about 500,000 volumes, a polytechnic school and an observatory. Of its art works the most significant are those by Rubens, Rembrandt, Frans Hals, Vandyke and Teniers.

The city has long been famous for its lace making. Other manufactures are curtains, carpets, metal, furniture and leather goods. It is the center of the na-

tional railway system, and canals connect it with Charleroi, Mechlin, Antwerp and the ocean. Electric tramways facilitate transportation to the suburbs, and it is becoming more and more a seat of residence for the wealthy. The Belgians show their love for music by arranging for concerts the year round, and through the winter and spring the opera continues at the Théâtre de la Monnaie. Brussels was known as a prosperous city in 1430, and during the 17th century was referred to as one of the finest cities in Europe. It became the capital of Belgium in 1830, and was captured by the Germans in September, 1914.

Bru'tus, Lucius Junius (about 500 B. C.), a Roman patriot and hero, nephew of King Tarquin the Proud. The uncle had put to death the father and brothers of Brutus, and to save himself from the same fate he pretended to be *stupid,* the Latin for which, *brutus,* gave him his name. Brutus led the people in an insurrection against King Tarquin, which resulted in the overthrow of the monarchy and the establishment of a free government. Brutus was elected to the consulship, and upon the conspiracy of his sons to restore the monarchy, he caused them to be put to death. He was killed in battle with the enemies of the new government about 509 B. C.

Brutus, Marcus Junius (85-42 B. C.), a Roman citizen of note, one of Cæsar's assassins. At first Brutus was an enemy of Pompey, but later served with him in the civil war. After the Battle of Pharsalia, Brutus surrendered to Cæsar, who made him governor of Cisalpine Gaul and afterwards of Macedonia. But, though claiming to be a friend of Cæsar, when he was persuaded that the government was in danger of becoming a monarchy, he joined the conspiracy to assassinate him. The people were enraged by the assassination, and Brutus fled into Greece and Macedonia. The triumvirs, Antony, Lepidus and Octavius, defeated the army of Brutus and Cassius at Philippi, and Brutus slew himself by falling upon his sword.

Bry'an, William Jennings (1860-), a distinguished American lawyer and statesman, born at Salem, Ill. He graduated from Illinois College in 1881, from the Union College of Law at Chicago in 1883, and began practice at Jacksonville, Ill.; but after four years removed to Lincoln, Neb., which he thenceforth made his home. Here he soon became interested in politics and gained a reputation as a speaker on economic subjects, and especially as an eloquent advocate of free trade. From 1890 to 1894 he served as a Democrat in Congress, being elected by a large majority in a Republican district. He was on several important committees and increased his reputation as an orator. On his retirement from Congress he became editor of the Omaha *World-Herald,* but soon resumed his law practice in Lincoln.

At the Democratic National Convention in Chicago in 1896 Mr. Bryan made a remarkable speech urging the free coinage of silver at the ratio of sixteen to one, which so captured the convention that he was nominated for the presidency of the United States with great enthusiasm. The campaign which followed was one of the most notable in American history, Mr. Bryan traveling 18,000 miles and delivering 600 speeches to 5,000,000 people. He was nevertheless defeated by William McKinley, the Republican candidate.

At the outbreak of the Spanish-American War in 1898 he organized a volunteer regiment and was chosen its colonel. In 1900 he was again nominated for the presidency and was again defeated by Mr. McKinley by an increased majority. He then founded *The Commoner,* a weekly journal for the discussion of political issues. Mr. Bryan made a tour of the world in 1906, was everywhere received with distinguished honors, and welcomed home in New York City with a great demonstration. In 1908 he was nominated for the presidency a third time, but was defeated by William H. Taft. He remained, however, a leader in his party, and at the Democratic National Convention of 1912, held at Baltimore, he demonstrated his power by securing

the nomination of his candidate, Governor Wilson of New Jersey.

Mr. Bryan is a captivating public speaker, and has been prominent as a Chautauqua lecturer. He takes his place in history among the "defeated Presidents," which include Webster, Greeley, Clay, and Blaine. In 1913 President Wilson appointed him Secretary of State, but on June 8, 1915, Mr. Bryan resigned because of a disagreement with the President regarding diplomatic correspondence with Germany.

Bry'ant, William Cullen (1794-1878), the first great American poet, born in Cummington, Mass. He came of good stock; his father, a physician and a man of intelligent mind and scholarly tastes, was of Puritan ancestry, and his mother was a descendant of John and Priscilla Alden. The Bryant children were sensibly and carefully brought up and were early led to cultivate literary tastes. Bryant showed marked precocity as a child, and his poetic gift became manifest, when, at the age of 13, he wrote a poem addressed to President Jefferson, expressing his opposition to the Embargo Act, at that time a serious menace to the commercial prosperity of New England. At the age of 17 he entered Williams College, but was unable to finish his course on account of lack of funds. We next find him studying law, and, although the legal profession was distasteful to him, he engaged in the practice of law several years, in the town of Great Barrington, Mass. While practicing law he was very happily married to Miss Frances Fairchild.

In the meantime he was becoming known as a literary man. In 1817, *Thanatopsis,* written before he was 19, was published in the *North American Review.* The chief editor of this periodical, Richard Henry Dana, on hearing it read, seriously doubted if any poem of such merit could be written in America. Up to this time America had produced one great prose writer, Washington Irving, but Bryant was the first poet of importance. *Thanatopsis,* with its simple and luminous style and serenity and dignity of tone, has all the essential characteristics of Bryant's later poems. He reached the level of excellence in his first poem that he maintained to the end of his life. In this, the work of Bryant was unique. A number of other short poems, including *To a Water Fowl, The Yellow Violet* and *An Inscription to the Entrance of a Wood,* appeared, and in 1821 a collected edition of his poems was published.

In 1825 Bryant abandoned the law, removed to New York, and the following year became associated with the *Evening Post,* a periodical from which he never severed his connection. In 1828 he became its chief editor, and his long career as a journalist brings out clearly his sturdy qualities. He entered fully into the civic and political life of New York, made his paper a strong force for education and righteousness and became a prominent leader in all movements for the advance of the arts and literature. The poems he wrote during those years of public activity were not numerous, but all show careful workmanship. He visited Cuba, Mexico, Europe, Egypt and the Holy Land and traveled extensively in his own country. In addition to writing poetry he found time to write descriptions of his travels, and he also made translations of the *Iliad* and *Odyssey.*

A life upon which no stain ever rested, and which always reflected the simple habits and well-balanced character of the poet-journalist, was to the end given to public service. On May 29, 1878, Bryant delivered the oration at the unveiling of a statue to Mazzini in Central Park, New York. Overcome by the exertion and the heat of the day, he fell as he was entering the home of a friend. He died two weeks later.

Bryant holds an important position in American letters. He was the founder of a definite school of journalism and the pioneer in the poetry of a new nation. His poetry reflects his own lofty ideals and purity of character; it is always restrained, serene and refined. His range of subjects was limited; the contemplation of the earth and sky fur-

nished him themes, and the poems by which he is best known are nearly all charming nature lyrics. In his freedom from affectation, sweetness of tone and delicate descriptions of nature, he is like the English poet, Wordsworth, who had sounded the call of a new era in poetry when Bryant was a child. Compared with other American poets of his rank, the list of his works seems short, yet his poetry shows a finish of style and a mastery of his art that place him among the foremost poets of his country.

His best-known poems are *Thanatopsis, To a Water Fowl, Robert-of-Lincoln, The Fringed Gentian, The Death of the Flowers* and *The Flood of Years.*

Bryce, *Brys,* **George** (1844-), a Canadian clergyman and educator, born at Mt. Pleasant, Ontario, and educated at the University of Toronto. He was ordained to the ministry in the Presbyterian Church in 1871 and the following year became pastor of the Knox Church, Winnipeg, which he organized. He devoted many years to religious and educational work, acting as moderator of the Manitoba Synod and of the Presbyterian Church, Canada, and serving on the faculty of Manitoba University, which he helped to found in 1871, and on the faculty of Toronto University. He retired in 1909. Dr. Bryce is a member of the American Association for the Advancement of Science and president of Manitoba Historical Society.

Bryce, James (1838-), an English writer and statesman, born in Belfast, Ireland, and educated at Glasgow University and Trinity College. His publication in 1864 of the brilliant treatise entitled *The Holy Roman Empire* gave him a reputation as a historical writer. He began the practice of law in 1867, was regius professor of civil law at Oxford from 1870 to 1893, and in 1880 entered Parliament, where he became a prominent Liberal, and occupied several official positions. In 1894 he was president of the Board of Trade and also served as chairman of the Royal Commission on Secondary Education. When the Campbell-Bannerman ministry was formed in 1905, Mr. Bryce became chief secretary for Ireland, and in 1907 was appointed British ambassador to the United States. The latter position he resigned in 1912. In 1913 he was appointed a member of the Permanent Court of Arbitration at The Hague. He has been a conspicuous advocate of Home Rule for Ireland, of the abolition of university tests, of international copyright and of statute law revision. By Americans he is probably best known for his remarkable account of their political institutions, entitled *The American Commonwealth.* His *South America* is a work of great merit. He was created Viscount Bryce in 1914.

Bryn Mawr, *Brin Mahr.* See WOMEN, COLLEGES FOR.

Bryophyte, *Bri' o fite.* See BOTANY, subhead *Classification.*

Buchanan, *Bu kan' an,* **James** (1791-1868), fifteenth president of the United States, born near Mercersburg, Pa., of Scotch-Irish parentage. He graduated from Dickinson College, Pennsylvania, in 1809, studied law and was admitted to the bar in 1812, when he began practice in Lancaster. In 1814 he was sent to the State Legislature; in 1821 to Congress, where he served for ten years; in 1831 to Russia to negotiate a commercial treaty; and in 1834 to the United States Senate. He remained in the Senate until 1845, when he became secretary of state under President Polk, serving throughout his entire administration. Two of the most important questions settled during his incumbency were the Oregon boundary and the annexation of Texas.

Retiring to private life in 1849, Buchanan was appointed minister to England in 1853, but was recalled in 1856 at his own request. The same year he was elected to the presidency of the United States on the Democratic ticket, and served for one term. Meanwhile the slavery question had become the burning issue before the country. Buchanan was opposed to slavery, but was also opposed to interference with the rights of the slaveholders. He favored conciliatory legislation. When secession finally came,

he denied the right of a state to secede from the Union, but denied also the constitutional right of the Federal Government to coerce the states to remain in the Union. The general government could, therefore, wage only a defensive warfare when attacked by the seceding states. After the expiration of his term of office and the inauguration of Lincoln in 1861, Buchanan spent the remainder of his life at his home near Lancaster. In 1866 he published *Mr. Buchanan's Administration on the Eve of the Rebellion,* which was a defense of his policies and administration.

Bucharest, *Boo" ka resť.* See BUKHAREST.

Buck, Dudley (1839-1909), an American musical composer, born at Hartford, Conn. He studied in Leipsic, Berlin and Paris, and later held important positions as organist in Hartford, Chicago, Boston and New York. He was for a time associated with Theodore Thomas as conductor of orchestral concerts, and in 1880 won the $1000 prize of the Cincinnati Music Festival for his cantata *The Golden Legend.* His compositions are numerous, and include many songs, much church music, several cantatas, a symphony, a symphonic overture and two operas, *Serapis* and *Deseret.* He also published a valuable theoretical work entitled *Illustrations in Choir-Accompaniment, with Hints on Registration.*

Buck Bean, a medicinal herb of the Gentian Family, found in swamps and bogs of Europe and North America. It is a fine large plant growing from thick, dark-colored roots. The leaves are made up of three oblong leaflets somewhat broadened at the apex. The flower stalk is without leaves and is surrounded by a pyramid of reddish flowers in which each individual flower has a five-parted calyx and a flat, five-lobed corolla lined with soft hairs. The flowers bloom in May and are followed by a pod containing the beans. Buck bean is an herb whose bitterness accounts for a part of its popularity with herb doctors. It is also called bog bean, bog myrtle and marsh trefoil.

Buck'board", a four-wheeled vehicle, so called because these were originally constructed to *buck against,* or withstand rough usage on the poor roads then general throughout New England and the Middle States. The seat, for one or more persons, was fastened on a plank, or on slats placed side by side. These connected the hind axle with a crossbar, which was attached to the center of the front axle by a kingbolt. In some localities the buckboard is called a springboard.

Buckeye, *Buck'i",* the name of a number of species of the Horse-Chestnut Family, found in central United States south of Michigan. The tree is not tall but has a beautifully rounded top made up of almost straight branches. The foliage, which is dense, is formed by clusters of leaves, each composed of five or six leaflets arranged in a starlike group. The winter buds are large and sharply pointed. The flowers grow in loose, erect clusters and are followed by bur-covered, three-seeded nuts, also called buckeyes. These nuts are not edible on account of their bitter taste and disagreeable odor; the nut of the sweet buckeye, which is sweet only in comparison with that of the fetid buckeye, is sought by cattle and swine, and an adhesive paste is made from the kernel. The bark of the buckeye is scaly and rather thin. Its wood is used in the manufacture of wooden limbs, splints, pulp for paper making and woodenware.

Buckingham, *Buk' ing am,* **George Villiers,** FIRST DUKE OF (1592-1628), an English nobleman, a favorite of James I and Charles I. He undertook, in 1623, a mission for James I, at Madrid, while the latter was negotiating for the marriage of the Spanish Infanta with the Prince of Wales. The negotiations proved a failure, but Buckingham retained his position and later concluded the treaty for the marriage of Charles I with Princess Henrietta of France. Shortly afterwards he was impeached by Parliament for his connection with the ill-fated expedition to Cadiz, but was saved by the King's timely dissolution of Parliament. While preparing an expedi-

tion to relieve the French Huguenots, Buckingham was assassinated.

Buckingham Palace, a royal residence in London, located upon the site of the city home of the Buckingham family and facing St. James's Park. It was built during the reign of George IV and is a huge three-story building having long wings. The palace has a throne room where presentations are made, state rooms and private apartments. It is one of the favorite residences of the British rulers.

Buck'ley, James Monroe (1836-1920), an American clergyman and author, born at Rahway, N. J. He studied theology at Exeter, N. H., and was ordained a Methodist Episcopal minister in 1859. He served as pastor of churches in New Hampshire, Michigan, Connecticut and New York until 1880, when he became editor of the New York *Christian Advocate;* this position he held with honor for 32 years, retiring in 1912. Among his writings are *Oats or Wild Oats, Travels in Three Continents — Europe, Asia, Africa, History of Methodism in the United States* and *Supposed Miracles.*

Buck'ner, Simon Bolivar (1823-1914), an American soldier and governor, born in Kentucky and educated at West Point. He was instructor of ethics and, later, of infantry tactics at West Point, served in the Mexican War, being brevetted captain, practiced law in Kentucky and at the opening of the Civil War joined the Confederate army, distinguishing himself especially at Ft. Donelson, Murfreesboro and at Chickamauga. Having previously been commissioned lieutenant-general, he surrendered the last Confederate corps to the Federal general, Canby, May 26, 1865. President Grant selected him to be one of his pallbearers; he was governor of Kentucky from 1887 to 1891 and candidate for the vice-presidency, on the Gold Democrat ticket, in 1896.

Buck'tails", the name applied from 1816 to 1830 to a faction of the New York State Democrats identified with Tammany and opposed to the administration of Gov. DeWitt Clinton. The name was derived from their wearing a buck's tail in their hats as a badge. The Bucktails became the Democratic Party of the state after the death of Clinton in 1828. See POLITICAL PARTIES IN THE UNITED STATES.

Buck'thorn", a thorny hedge shrub of the Buckthorn Family. It grows to a height of from four to ten feet and takes readily to pruning. The foliage is fine and only thinly covers the branches. The individual leaves are oval in shape and have smooth or finely-toothed margins; these fall early without having become tinged with autumn colors. The flowers are small and tubular in form. They grow in clusters and are followed by black stone fruits, which are rather ornamental. The wood of the buckthorn produces a charcoal which is used in the manufacture of gunpowder.

Buck'wheat", an erect herb of the Buckwheat Family which grows wild in waste grounds but is cultivated for its grain. The stems are smooth and slim with heart-shaped leaves, which are from two to four inches in length and about half as wide. There are many fragrant white flowers, which have no petals but whose five-parted calyx is colored like a corolla. At the bases of the eight stamens are the well-filled honey-bearing cells, which attract the bees from long distances to the fragrant buckwheat fields. The fruit is a black three-cornered nut which resembles the beechnut in shape, and from it, derives its name, since *buck* is an old form of the word *beech.* From its uses buckwheat is generally classed as a grain.

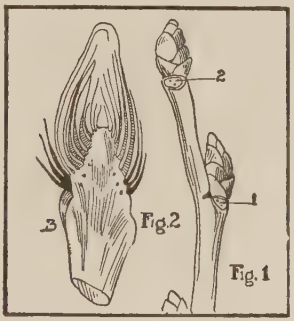
Buckwheat grows readily in light, dry soils. It is raised in the United States and Canada for the sake of the flour ground from the seed and used in the preparation of breakfast cakes. It is not a large crop in this country, but is grown to some extent in all states east of the Mississippi River and north of Kentucky. In China and Russia buckwheat is cultivated extensively as a food product, but elsewhere in Eastern countries is not well known.

Bucyrus, *Bu si' rus,* **Ohio,** a city and the county seat of Crawford Co., 62 m. n. of Columbus, on the Sandusky River and on the Pennsylvania, the Ohio Central and the Toledo, Walhonding Valley & Ohio railroads. The city is situated about 1000 ft. above sea level, and the surrounding country is largely adapted to agriculture and stock raising. Numerous mineral springs abound in the vicinity. Bucyrus has wide and well-paved streets and numerous handsome residences. There is a fine city park. Interurban electric lines connect with the near-by towns and cities.

The noteworthy buildings include a public library, Y. M. C. A. Building, courthouse, city hall, post office and a number of churches. There is an excellent system of public schools. Bucyrus has extensive manufactories of heating and ventilating apparatus, school and office furniture, clay-working and general machinery, wagons and carriages, agricultural implements, interior woodwork and structural iron. Large railroad shops are located here. The first settlement was made in 1818 and the place was incorporated as a village in 1830. A city charter was granted in 1885. Population in 1919, estimated 10,000.

Bud, an undeveloped shoot of a plant, the term *shoot* being understood to include the stem and leaf or flower. The apex of a stem is unprotected, and this is the growing point from which the bud is produced. The leaves, either foliage or floral, grow from the lower part first, and, as these develop faster than the stem upon which they are borne, the lower ones envelop the less advanced, forming the typical leaf bud. Sometimes these buds are to remain for a long time undeveloped and they are then covered with bud scales, which are resinous, woolly or brittle according to the need of the plant. Such buds are called *dormant* buds. In the oak and the beech dormant buds retain their vitality for hundreds of years. The majority of buds, however, lie dormant only through a single season.

The arrangement of leaves in the bud forms an interesting study. In some buds each leaf is separately folded, in others, the leaves overlap or are rolled together. In the cherry each leaflet is folded along the midrib; in the maple the lobes of the leaf are plaited like a fan; the ferns are rolled from the tips toward the stems; leaves of the violet and water lily roll from both edges inward; and those of the wood sorrel have each leaflet folded on the midrib and then the three leaflets laid flat together. A head of cabbage, which is an extremely large bud, shows plainly the crumpled arrangement of leaves upon a short thickened stem. Flower buds show the same adaptation to space in the arrangement of their parts. They appear in the same manner and position as the leaf buds and are understood to be only specialized forms of the same.



BUDS, SHOWING POSITION AND STRUCTURE

In the accompanying cut Fig. 1 shows a twig of the elm with the leaf scars, 1 and 2, marking the places where the last year's leaves broke off. Fig. 2 is a longitudinal section of one of those buds considerably enlarged. The center of the bud will develop into the new shoot and the tiny layers will form the leaves. Compare this section with a corresponding section of the cabbage.

Budapest, *Boo' da pest",* the capital of the country of Hungary, consisting of Buda on the right bank of the Danube River and Pest on the left, situated about 173 m. by rail s.e. of Vienna. Several bridges, among them the Kettenbrücke and the Schwurplatz, connect the two towns. The city is famous for its strong sulphur and bitter water springs. Buda, the older and the smaller, is picturesquely located around two hills, one of which is crowned with the royal palace and a citadel. Other prominent

buildings are the Parish Church, the Turkish Mosque, the new Houses of Parliament, an academy of science, a national museum, a national art gallery, the Royal Opera House, the Palace of Justice, the National Theater and the courthouse of the Royal Supreme Court. The slums have been slowly removed and the city is being gradually converted into one of the handsomest capitals of Europe. The University of Budapest is a national Hungarian institution with an attendance of over 5000 students.

Next to Vienna, Budapest is the most important city in the country for commerce and industry. It is the central point of all the Hungarian railways, and exports the greater part of the agricultural produce of the country. Second in importance only to the trade are the manufactures, which embrace machinery, cutlery, leather and metal wares, scientific and musical instruments, starch, beer and cement. There are also large flour mills, shipbuilding yards, three government tobacco factories and a government firearms factory. The history of Buda dates back to 150 A. D., when it was Aquincum, a Roman camp; that of Pest, to the 13th century, when it is referred to as a flourishing town inhabited by Germans. Buda became a free imperial city in 1686, the capital of the Hungarian Kingdom in 1867, and the two towns, Buda and Pest, were united in 1873. Population 880,371.

Buddhism, *Bood'izm,* the name given to the philosophical system of Indian thought, formulated by Siddhartha Gautama, the Buddha (enlightened). Buddhism is a reform of Brahmanism undertaken by Buddha in the sixth century B. C. Although the temples of Buddhism are innumerable, containing images of Buddha, before which the people prostrate themselves in worship, yet Buddhism is really a religion without a god; Buddha probably did not expect that his followers would worship him. Indeed, the most characteristic teaching of Buddhism is that when one has attained the godlike qualities he passes into Nirvana, which is absolute loss of existence. The four great truths of Buddhism are intended to lead to Nirvana. (1) Pain is always present where there is life. (2) Passions and desires are the cause of all modes of life. (3) There is no escape from existence, except by the destruction of all passion and desire. (4) This may be accomplished by following the fourfold way to Nirvana: namely, the awakening of the heart; the eradication of all impure desire and vengeful feeling; the state of freedom from the struggle against natural impulses; finally, Nirvana, the extinction of being.

The doctrine of transmigration of souls has an important relation to the purifying necessary to reach Nirvana. This doctrine teaches that if perfect freedom from all personal relations, passions and desires is not attained at death, then the soul passes into some other form of life, anything from a plant or insect through all the gradations of vegetable and animal life for thousands of years, if need be, until the purification is complete and Nirvana reached.

Bu'ell, Don Carlos (1818-1898), an American soldier, born near Marietta, Ohio, and educated at West Point. He served against the Seminoles, during the Mexican War was brevetted captain for his services at Monterey and major for his work at Churubusco, where he was severely wounded, and in May, 1861, became brigadier-general of volunteers. He organized troops in Washington, succeeded Sherman in the Department of the Cumberland and arrived at Shiloh in time to assist in the Confederate defeat. Later, in command of the Army of the Ohio, he thwarted Bragg's invasion of Kentucky, defeating him at Perryville, but he subsequently transferred his command to Rosecrans. A military commission made an unfavorable report of his campaign in Kentucky and Tennessee, whereupon he resigned from the service, June, 1865. Many critics consider Buell to have been very efficient.

Buena Vista, *Bu'na Vis'ta,* **Battle of,** an important engagement of the Mexican War, fought Feb. 22 and 23, 1847, between 4800 Americans, under Gen.

Zachary Taylor, and 17,000 Mexicans, under Santa Anna. Buena Vista is a settlement in Mexico on the San Juan. During the first day the Mexicans tried unsuccessfully to drive Taylor from Angostura Heights. Hostilities ceased during the night, when all the troops suffered from the cold, and until late the next day the hard-fought battle was undecided. Then, by concentrating their batteries against the Mexican center and by protecting their right flank with riflemen, the Americans won a complete victory. The Americans lost 750 men; the Mexicans, 2000. This was the last important engagement of the northern campaign. See MEXICAN WAR.

Buenos Aires, *Bo' nus A' riz,* a city of Argentina, capital of the republic, situated on the southern bank of the La Plata River, about 155 m. above its mouth. The city extends over an open, grassy plain, and the regularity and uniformity of the plan of the older parts presents an uninteresting and monotonous aspect. The architecture is principally Spanish and the houses are low, with flat roofs and parapets and heavily barred windows. In the newer and foreign quarters the architecture of the French Renaissance prevails. The streets are paved with wood or asphalt and are well lighted.

PUBLIC BUILDINGS. Along the avenue, Avenida de Mayo, and surrounding the square, the Plaza de la Victoria, are many handsome buildings. There are the Cathedral, the episcopal palace, the post office, the Government Palace, the university, the Hall of Congress, the exchange, the Palace of Justice, the Hotel Argentina, the municipal building and the department of the police. The city has 20 theaters, the finest one being the Teatro de la Opera; the attention paid to theaters suggests the fondness of the inhabitants for music and entertainment. A race track is found in the suburb of Palermo. There are 15 hospitals, a crematory, a Pasteur Institute and homes for immigrants and the friendless. The Roman Catholic churches number about 25, and the Protestant four. There are

BUENOS AIRES

two libraries, the municipal and the St. Christopher. The schools are numerous and furnish adequate primary and secondary instruction. There are also professional institutions, the National University, one of the best in South America and possessing a library of 97,000 volumes, and several scientific and literary societies. The philanthropic association known as the Sociedad de Beneficencia is notable for its efficient work among the immigrants. The Museum of Natural History contains the famous Burmeister collection.

COMMERCE AND INDUSTRIES. The manufactures, represented by about 9000 shops and factories, are carriages, machinery, furniture, woven goods, leather, shoes, hats, liquors and tobacco. The exports include grain, live stock, wool and cattle products. One-half the export trade of the country is handled by Buenos Aires, and the trade with the United States is large. The "Madero docks" provide extensive shipping facilities.

HISTORY. The city was founded in 1535 by Don Pedro de Mendoza, and was given the name of Ciudad de la Santisima Trinidad y Puerto de Santa Maria de Buenos Ayres, so called in honor of "Our Lady the Virgin Mary of good air and winds." Two unsuccessful attempts at a settlement were made, but by 1580 it was firmly established. It was a dependency of Asuncion until 1620, when the La Plata settlements were divided into the three parts, Paraguay, Tucuman and Buenos Aires, the growing city becoming the capital of the last named. In 1776 it became the capital of the Rio de la Plata provinces, which had then been formed into a viceroyalty. The English entered the city but were driven out in 1806, and their attack the following year was futile. In 1826 the city was made the capital of the Republic of the United Provinces of the River Plata. Between 1851 and 1859 it remained a separate state, after having ceded from the Republic. Later it joined the Confederation and was definitely declared the capital in 1880. The inhabitants are to a large extent foreign-

ers, chiefly Spaniards, French and Italians. Population, 1,596,927.

Buf'falo, a heavily-built animal of the Bovine Family, known in two principal species. They are bulky animals with massive heads which they carry low, and huge, wrinkled horns which in the African or Cape buffalo meet in a heavy ridge above the eyes. In spite of its size the buffalo is strong and active and can travel at high speed for a long time. Buffaloes travel in herds and in the presence of an enemy form a close, almost unassailable bunch; they are fierce in attack and rush upon their foe, toss it into the air and trample upon it, all the time pawing the earth and giving vent to a ferocious bellowing. The hide of the buffalo is blue-black with scattered patches of thin hair on the body and a heavier growth upon the knees and breast. Buffaloes have long been of use as beasts of burden and in husbandry in the Indian and Egyptian rice fields, but they have never become really domesticated nor do those breeds which have been used by man for centuries show any marked differences from the original type. The American buffalo is more properly called the bison. See BISON.

Buffalo, N. Y., a port of entry, second city in population in the state and county seat of Erie Co., on the eastern extremity of Lake Erie and on its outlet, the Niagara River, 297 m. w. of Albany, the capital of the state, 425 m. n.w. of New York City and 540 m. e. of Chicago, on the New York Central & Hudson River, the Erie, the Lehigh Valley, the Delaware, Lackawanna & Western, the Pennsylvania, the Lake Shore & Michigan Southern, the New York, Chicago & St. Louis, the Grand Trunk, the Canadian Pacific, the Michigan Central, the West Shore, the Pere Marquette and other railroads. Over 715 m. of railroad trackage are embraced within the city limits. By reason of its favorable location in respect to the Great Lakes transportation and its position on the chief route between the East and West, Buffalo has become one of the most important commercial and industrial centers in the country. The lake commerce is extensive; 13 lines of steamships ply the lakes from Buffalo. The city has direct passenger and freight connection with Detroit, Cleveland, Duluth, Superior, Milwaukee, Chicago and various other important ports. Buffalo has about 10 m. of wharfs, and has a water front of approximately 20 m. The shipping facilities have been largely increased by the extensive harbor improvements under direction of the Federal Government. A series of inner piers and breakwaters, and an outer breakwater of stone and cement, four miles in length, have been constructed at a cost of over $2,000,000. The harbor thus formed is one of the best on the lakes, and the city itself owns a large tract of land, acquired at a cost of nearly $1,000,000, for the use of increased docking facilities. About 7000 lake vessels arrive at and clear from the port of Buffalo annually. The city is the port of entry of Buffalo Creek customs district. The Erie Canal makes a great commercial waterway through the heart of the state to the Hudson River (See ERIE CANAL). Although popularly called the 1000-ton barge canal, it will in reality carry boats having a capacity of 2000 tons. Besides the lake and canal transportation Buffalo has unlimited hydraulic electric power from Niagara for manufacturing purposes.

The street-car system of Buffalo has about 400 m. of track, and carries passengers for a five-cent fare, with a universal transfer to any part of the city. The interurban, as well as the urban, service is regarded as one of the best-equipped systems in the country and has greatly enhanced the beauty and value of the outlying districts and suburbs. Trolley service is maintained with Niagara Falls, Lockport, Olcott Beach, a popular resort on Lake Ontario, Youngstown, Erie, Chippewa and many other towns and cities. The Canadian shore and Grand Island are dotted with beaches and resorts.

PARKS AND BOULEVARDS. Buffalo covers an area of about 42 sq. m., and has spread mainly north and east up a grad-

ual rise to a plateau 80 ft. above the lake and 620 ft. above sea level. The city is widely known for the beauty of its residential districts. The avenues are lined by magnificent residences and shaded by beautiful elms and maples. Among the finest residential streets are Delaware Avenue and North Street, crossing it at right angles. These avenues have large separate mansions, with great lawns, gardens and shrubberies. Among the newer attractive suburbs are Central Park, North Park and Kenmore. The parks of the city contain over 1229 acres and are finely maintained, the largest being Delaware Park of 365 acres, including a lake of 47 acres. The north part of this park was enclosed in the grounds of the Pan-American Exposition of 1901. Among the others are Cazenovia, South, Humboldt, Riverside and Stony Point parks. Lafayette Square, containing a soldiers' monument, is in the heart of the city, and Niagara Square contains the famous McKinley Monument, designed by John Mervin Carrère. This monument takes the shape of a shaft with four sleeping lions at the base, and is built of marble trimmed with bronze. Overlooking the lake at the river entrance is "The Front," a bold bluff or park, 60 ft. high. This is also the site of Ft. Porter, where several companies of United States soldiery are stationed. Buffalo is connected with the Canadian shore by ferry, and by the International Bridge from Squaw Island, which was completed in 1873 at a cost of $1,500,000.

Public Buildings. The noteworthy public buildings include: the Federal Building, erected at a cost of $2,000,000; city hall, with a clock tower 245 ft. high, costing $1,500,000; Chamber of Commerce Building; the 65th and 74th Regiment armories; Elmwood Music Hall; Broadway Convention Hall; Y. M. C. A. and Y. W. C. A. buildings; Masonic Temple, the Twentieth Century, Saturn, County, Buffalo, University and Yacht Club buildings; the Iroquois, Lafayette, Lenox, Touraine, Markeen, Genesee and Statler hotels; Bank of Buffalo, the Marine National, Buffalo Savings, Manufacturers and Traders, Peoples, Third National, Columbia National, Erie County, Buffalo, Fidelity Trust Company and Commonwealth Trust banks; the Teck, Star, Majestic and Shea's theaters; the Brisbane, Fidelity Trust, Marine National Bank, Mutual Life, General Electric, Ellicott Square, Sidway, Dun, Prudential, White, New York Telephone, Iroquois National, Gas Fuel Company and Morgan buildings; and substantial business blocks. The Buffalo Historical Building was built by the state for the Pan-American Exposition, and at the close was presented to the Buffalo Historical Society. There are about 220 churches, including St. Joseph's (Catholic) and St. Paul's (Episcopal) cathedrals. Other notable church edifices are Trinity, Westminster, Delaware Avenue Baptist and the First Presbyterian.

Institutions. The educational institutions include Buffalo University with affiliated law, medical, pharmacy and dentistry departments, Niagara University, Canisius College (Catholic), Martin Luther Seminary, a state normal school, Buffalo Seminary, the Franklin, Elmwood, Nichols and Heathcote schools, St. Mary's and Holy Angels' academies, St. Joseph's Collegiate Institute, D'Youville College, St. Margaret's school for girls, the Masten Park, Central, Lafayette and Technical high schools, vocational, public and parochial schools and a city training school for teachers. The principal libraries include the Buffalo Public, the Grosvenor, the state law, the John C. Lord and the Catholic Institute. The Natural Science Museum is housed in the public library building, and the superb Albright Art Gallery in Delaware Park is not exceeded in point of beauty by any other art gallery in the world. Buffalo contains a large number of benevolent and charitable institutions, many of them richly endowed. Of the children's institutions the most noteworthy is the free Fitch Institute, a combined orphanage and day nursery. Others include the Buffalo Orphan Asylum, Church Home, St. John's Orphans' Home, St. Vincent's and St. Joseph's

orphanages (Catholic), St. Mary's Institute for Deaf-Mutes, St. Mary's Asylum for widows and foundlings, Inglehart Home for erring women, homes for aged people, and 19 hospitals, including the United States Marine Hospital and Children's Hospital.

INDUSTRIES. Buffalo is one of the principal grain and flour markets of the world. Its elevators have a capacity of over 28,250,000 bushels. The city is also one of the greatest linseed oil markets in the country. At Tonawanda, a part of the port of Buffalo, are handled immense quantities of lumber, coal and iron ore. As a manufacturing center Buffalo ranks next to New York among the cities of the state. The manufacturing industries are represented by Pullman car works, smelting works, automobile plants, lumber and planing mills, forge works, slaughtering and meat-packing plants, rubber works, steel works, pottery works, flour mills, paint works, printing and lithographing plants, shipyards, petroleum refineries and manufactories of architectural and ornamental iron, clothing, soap and candles, leather and leather goods, carriages and wagons, confectionery, furniture, tobacco and cigars, saddlery and harness, soft drinks, patent medicines, jewelry, hardware, steam pumps, elevators, traction engines, threshing machines, stoves, ranges and office furniture.

HISTORY. LaSalle visited the place in 1679 and built at the mouth of the Cayuga Creek a little 60-ton vessel called the *Griffin*. In 1792-93 the Holland Land Company bought a large tract of land in the vicinity and established a town in 1801 which was called New Amsterdam. The place was soon called Buffalo, probably from the herds of bison which frequented the salt licks near by. Upon the outbreak of the second war with Great Britain, Buffalo and Niagara Falls became a center of military operations, the British Ft. Erie being directly across the Niagara River. The growth of the town was small until after the completion of the Erie Canal in 1825, when it became a distributing center between the East and West. A city charter was granted in 1832. Black Rock village, which was for many years a commercial rival of Buffalo, was brought within the city limits in 1853. Grover Cleveland lived in Buffalo from 1855 until 1884, when he was elected president. President McKinley was assassinated here on Friday, Sept. 6, 1901. In 1914 Buffalo adopted the commission form of government. Population in 1920, 506,775.

Buffalo Bill. See CODY, WILLIAM FREDERICK.

Buffalo Bur, a troublesome weed of the Nightshade Family common in the United States. It is a straight, branching plant with coarse leaves and insignificant flowers. Its fruit is a bur-covered nutlet, which clings to clothing or the fur of animals and so becomes widely spread. It is troublesome on this account but is a weed which is easily eradicated if not allowed to seed.

Buffalo Grass, a fine, lawn-covering representative of the Grass Family, native on the Western plains from Canada to Texas. In its native state it is used as a grazing grass because it grows thickly, spreads rapidly and has short, rather broad leaves. It has been introduced into cities as a lawn grass and is well adapted to that purpose.

Buffalo Moth. See CARPET BEETLE.

Bug, an indefinite, unscientific name commonly applied to any small, elusive animal that crawls. Scientifically the name Hemiptera is given to the class of Insects including the most of the so-called bugs. Some, however, as the June bug, ladybug, tumblebug and potato bug, are beetles. Popularly the word seems to refer to any unpleasant insect which may or may not be harmful. Many of them which seem disagreeable are really very interesting once their habits are known, and do not deserve the name bug used as a term of reproach. Others are among the most harmful of insects. See HEMIPTERA.

Bug'gy, the name given in the United States to a light four-wheeled vehicle with or without a top, commonly, but not always, drawn by one horse. In

England the buggy is a light, one-horse, two-wheeled vehicle, with or without a top; but in India a top is considered necessary, because protection from the sun's rays is there essential to the welfare of the Caucasian.

Building and Loan Associations, proprietary or mutual associations through which many acquire ownership of real estate by relatively small, periodical payments. Proprietary associations receive money on deposit, paying interest thereon; and make loans repayable in installments. Mutual associations issue shares on which regular payments must be made until these mature, the many small amounts paid in on shares being loaned in lump sums to those members who offer the highest interest. In each case the properties purchased with loans from the association are mortgaged to it, until the loans are repaid. The sums which accrue to a mutual association from interest on loans, less the expenses for management, are divided proportionally among all shareholders and thus hasten the maturing of their shares.

In general, associations cannot make loans for the full value of properties purchased, since ample security is as necessary in these as in any other business transactions. Nor may the loan received from a mutual company exceed the value of those shares for which the member has subscribed; for the ultimate cancellation of his mortgage, and of the loan secured by it, depends upon regular payments on shares taken. That member of a mutual association who has borrowed nothing from it, or who has borrowed less than the face value of his shares, receives upon their maturity the total value of these, or the total value less the amount of his loan. In most states building and loan associations are subject to strict regulation; and the efficiency with which they are conducted is indicated by the fact that, throughout the country, the expenses for management, on assets amounting in 1919 to $2,000,000,000, were less than three-fourths of one per cent. These associations enable many wage earners to build and own their homes.

Bukharest, *Boo" ka rest'*, or **Bucharest,** the capital of Roumania, situated upon the Dimbovitza River about 40 m. from its juncture with the Danube. The modern city is rapidly taking on a pleasing appearance, although until recently the streets and buildings have not been well cared for. There are many pleasant parks and gardens, fine church edifices and a number of excellent public buildings, including the royal palace, National Theater, the university, a mint and ample military fortifications. The climate is not especially agreeable, being changeable and of wide extremes of temperature. Bukharest has a large trade in grains, timber and petroleum, while its manufactures include nails, rope, glucose, army supplies and numerous other articles. Population, 350,000.

Bulb, a thickened, underground leaf bud, whose leaves or leaf bases have stored nourishment for the future growth of the plant. At the center of the bulb is apt to be a thin plate, which is the beginning of the stem. Where the leaves are thick but narrow the bulb is called a scaly bulb; the meadow lily or any wild lily has this kind. If the scales are broad and encircle each other and the stem, a coated bulb is formed; an example of this class is the onion. If a bulb is cut across and examined closely its resemblance to the leaf buds of the horse-chestnuts, for example, is easily seen. A corm, or solid bulb, is merely a thick underground stem whose leaves grow from it only above ground. The roots are fibrous and are put forth from its base. The Indian turnip, or Jack-in-the-pulpit, has a solid bulb. Bulblets, or small bulbs, are frequently formed above ground in the leaf axils or among flower clusters. These never expand into leaves or branches but fall to the ground and take root, starting as new plants; such bulblets are the familiar "sets" of onions. Bulbs retain life for at least a year and often longer, and are a common means of reproducing their species, as bulbous plants rarely produce seeds. In the accompanying illustration the two bulbs at the left are corms at different stages

of their growth. The third is the coated bulb of the hyacinth, which is very similar to the onion. The fourth is the scaly bulb of the violet wood-sorrel.

Bulbul, *Bool'bool,* or **Fruit Thrush,** a family of birds living in Asia, Africa, the Philippine Islands, Sumatra and Borneo. A large number of species are known. The colors are usually brown, black or greenish above and white or yellow below. A few species have more brilliantly colored plumage, in which blue and green are prominent. A common species is the Madras bulbul, or Ceylon nightingale. It is brown, the feathers being edged with white; the head is black; the abdomen and upper tail coverts, white; and the under tail coverts, crimson. The nest is composed of dry leaves and grass and is placed in bushes or on the lower branches of trees. Three pink eggs, with red, brown and gray spots, are laid.

BULBS

Bulgaria, *Bool ga' ri a.* One of the Balkan states, bounded on the north by Roumania; on the east by the Black Sea; on the south by Constantinople, the Egean Sea and Greece; on the west by Serbia. Its present bounds were arranged by the Treaty of Paris. Its estimated area is about 42,000 sq. m.

The People. The Bulgarians are of Finno-Ugrian stock, thus ethnically related to the Magyars of Hungary, but they lost that distinctive feature centuries ago and merged with the Slavic population they found in possession of the country when they arrived in Bulgaria late in the seventh century and are now rightfully called a Slavic people; yet their origin accounts for some distinctively national traits of character not pronounced in other Slavic people. Their name is derived from the Volga river where they founded an empire in the fifth century.

The Country. Bulgaria is the land of the Great Balkans with their wild beauty. The main range crosses the country from west to east, the Little Balkans are clustered in the southwest corner of the state and send their minor ranges to the south and east. Between the two principal ranges of the Balkans is the beautiful valley of the Maritsa. To the north of the main range the country subsides into the valley of the Danube. In the northwest is the Vratza Gorge with its romantic cliffs, dark primeval forests, and hills covered with lilacs. The mountains extend to the Black Sea and the shores are wonderful, with snow capped mountains towering over all. In the mountainous sections are extensive forests and bears, wolves, lynxes and other wild animals abound.

AGRICULTURE. Like most of the Slav peoples, the Bulgarians are mainly farmers and cattle breeders, and as the country is fertile they export quantities of grain, fields of roses cultivated for the perfume extracted from the flowers. Vineyards are common upon the southern hillsides, and silk and honey are also important products.

HISTORY. Like all the people in that section of Europe,—the Czechs, the Hungarians, the Slavs,—the Bulgarians have a history of an almost forgotten past of national greatness followed by a long night of gloom—in their case five centuries of Turkish misrule—from which they were liberated by the Russo-Turkish War of 1877-8, not fully, however, being left under the suzerainty of Turkey; in 1908, however, even that shadowy bond was cast off.

Since then, Bulgaria has had experience with two autocratic rulers both being foreign princes invited to rule the country. The first, Alexander of Battenberg, did much to develop Bulgaria but he was deposed in 1886. The second was Ferdinand of Coburg, known as the "Fox of the Balkans," an energetic ruler, under whose direction Bulgaria took a leading part in the confederation of the Balkan states against Turkey in 1911-12; but also under Ferdinand's coldly calculating guidance Bulgaria entered the World War as an ally of Germany. Just as the war was ending, he was compelled to abdicate.

Bulgaria was among the first to surrender at the conclusion of the World War. The treaty signed at Paris in November, 1919, compelled her to give up territory and pay indemnity.

Bull, a papal edict written upon rough parchment and sealed with the bulla, a round leaden seal having on one side the representation of St. Peter and St. Paul and on the other the name of the pope using it. The bull is always dated *a die Incarnationis* (from the day of incarnation), and is named after the first word or phrase of the main body of the edict.

Bull, O'le Bornemann (1810-1880), a famous Norwegian violinist, born at Bergen. To a great extent he accomplished his results without the assistance of teachers, but always as a close student of the great masters. He made many concert tours through Europe and America. He arranged numerous pieces for the violin; but his fame rests upon his qualities as a violin virtuoso. He is "the angel with the violin," mentioned by Longfellow in his *Tales of a Wayside Inn.*

Bull'dog", a variety of mastiff characterized by having a round, thick head, a short, wrinkled muzzle, loose-hanging lips and a protruding lower jaw which gives prominence to the lower front teeth. The eyes are round and ferocious, the ears broad and drooping at the ends, the chest strong and the forelegs wide apart. The neck is short and stout and is wrinkled in front by the formation of two loose but not prominent dewlaps. The body is compact, tapering and short-haired; its color is white, brindled or black. Bulldogs are noted for their strength and the tenacity of their grip. They are good watchdogs and, if early trained, are affectionate and gentle and unfailingly faithful to a trust.

Bul'lets, the solid projectiles fired from small arms. With smooth-bore muskets the bullet is round, that of the Brunswick rifle having a ring to take the groove of the barrel. The first expanding bullet was invented by Greener and was not round. In 1841 Delvigne, a Frenchman, invented the first expanding, elongated bullet. In 1847 Captain Minié of the French army invented the Minié ball, expanded by an iron cup at the base, which was driven into the lead by the explosion of the charge behind it. Modern bullets for small-bore guns are long and kept from turning over in flight by the whirl from the rifling. See RIFLE.

Bull'fight"ing, a diversion which the public tolerance of cruelty permitted in ancient Thessaly, at Rome under the empire, and later in England under the name of *bull-baiting.* The Moors are said to have introduced the bullfight into Spain. Here, although opposed at inter-

vals by both Church and State, the public has not yet recognized as abhorrent those features so repellent to other civilized peoples; and it is still known as the national sport of Spain and of various Spanish-American countries. There are approximately 225 bull rings in Spain, the one at Madrid having seats for 12,000 spectators. The best bulls are said to be worth from $200 to $300; 1300 are killed annually, beside 6000 horses, while some men are killed, and others seriously injured. At Madrid, during the season, at least one afternoon a week is given to bullfighting, and usually as many as eight bulls are killed, one by one, by the swordsman, after being baited and tortured to exhaustion by the *banderilleros* (footmen) and *picadores* (horsemen).

Bull'finch", a bird of the Finch Family. The bullfinch is about the size of the English sparrow. It is grayish or bluish-gray above; the wings and tail are black; the breast is bright red; and the top of the head is black. The nest is cup-shaped and is placed in trees or bushes near the ground. Four to five greenish-blue eggs with reddish spots are laid. These birds are thought to pair for life. Their food consists of seeds, berries and small fruit. In Germany and other countries the bullfinch is caught and caged, and, while by nature the song is not remarkable, by education it has become quite noteworthy, and good singers command high prices.

Bull'frog", the largest American frog, a member of the Ranid Family and found in the United States east of the Rockies from Canada to Mexico. The upper surface of the body is green, marked with smaller, dark spots; the head is bright green and the under surface of the body is pale but dotted with dim marks. The most noticeable feature of the bullfrog is the large tympanum, which in the male is larger than the flattened eye. The bullfrog rarely leaves the water but waits for its prey near the bank, partly immersed in the water, along which it skims before diving. The male bullfrog has a loud, hoarse voice which it seldom uses except at night or during a dark day. Unlike most frogs the bullfrog needs a second season in which to develop from the tadpole to the adult stage. The hind legs of the frog are used for food and are considered a delicacy. In some localities bullfrogs are raised to supply the market with frogs' legs. See FROG.

Bull'head", a stout-bodied, scaleless fish of the Catfish Family. Different species are found in all of the small lakes and streams of the Mississippi region and have been introduced into streams of the Pacific coast; one species is known in China. Bullheads are easily recognizable by their tough, slimy skin, which is yellowish-brown in color or frequently quite black. Their heads are vicious-looking, for both the upper and lower jaws are armed with black, dangerous horns and with long barbels, which are soft, sensitive appendages of use as the fish searches for food in the mud. The bullhead is an easy fish to catch, since it takes any kind of bait and is ready for it day or night; its flesh, however, is coarse and has slight food value. See CATFISH.

Bull Moose, the emblem of the Progressive Party, which was organized in 1912 under the leadership of Theodore Roosevelt. The circumstance giving rise to its adoption is as follows. Upon Mr. Roosevelt's return from a speaking tour through New England prior to the Republican National Convention at Chicago in 1912, one of the reporters laughingly asked him how he felt, and his reply was that he felt like a bull moose. This phrase, taken up in a spirit of fun, gradually became so identified with Mr. Roosevelt's campaign that it was decided by the Progressive leaders to adopt the bull moose as the emblem of the party.

Bull Run, Battles of, two important engagements of the Civil War, occurring in Virginia, 30 m. from Washington. On July 21, 1861, the first was fought, engaging 28,000 Federals under McDowell, and 31,000 Confederates under Johnston and Beauregard. McDowell, who was a good strategist, planned to open the battle with an attack on the six Confederate brigades posted along Bull Run Creek,

and sent Tyler, Heintzelman and Hunter to turn the Confederate left wing, in which movement they were so successful that by three o'clock the Union army began to rejoice in a victory. But McDowell had neglected to follow up his early advantage and take the strategic position at Manassas Junction, and this, together with the arrival of fresh Confederate troops, finally caused the Federals to be completely routed, many of the raw and panic-stricken militia fleeing to Washington. The Confederates lost 2000 in killed, wounded and captured; the Federals, 2800. It was early in this engagement that the Confederate General Bee had occasion to remark to his men, "Look at Jackson, there he stands like a stone wall!" Hence Jackson's sobriquet of "Stonewall." This battle was far-reaching in its influence. It gave the Confederates overconfidence in their strength, and at the same time it aroused the North to a realization of the gravity of the struggle before the government.

The second Battle of Bull Run, or the Battle of Manassas, was fought Aug. 29 and 30, 1862, between 40,000 Federals under General Pope, and a somewhat smaller Confederate army under Jackson. The latter had taken a strong position behind an old railroad grading, near Gainesville, where General Sigel attacked him at daybreak, Aug. 29. A series of heavy skirmishes rather than a pitched battle followed, with the advantage slightly in favor of the Confederates, for which Pope blamed Fitz-John Porter, who had failed to reinforce him. At nightfall Longstreet joined Jackson, and in an attack the next day the Federals were driven back with great loss, retreating finally towards Centreville. Pope's campaign in Virginia thus ended in disaster, and his Army of Virginia was consolidated, under McClellan, with the Army of the Potomac.

Bulls and Bears, terms used on the Stock Exchange or Board of Trade to designate opposing groups of operators. As the bull tosses up with his horns, the Bulls on the stock market attempt to raise prices and maintain them; while just as the bear tears down with his claws, the Bears on the market attempt to force down the price of this or that commodity or stock. Bulls are said to be "long" on a stock or commodity of which they hold very large quantities. Bears often "sell short," that is, contract to deliver, within 24 hours, or at some other stated time, a specified quantity of wheat, corn or some other commodity, or stock, which they do not then own. They are then "short," and, in order to fulfill their contracts, must, within the time specified, actually purchase the required quantity at the market price; for any Board of Trade or Stock Exchange would promptly expel a member who did not fulfill his contracts, besides confiscating the money deposited by him for his seat, or membership.

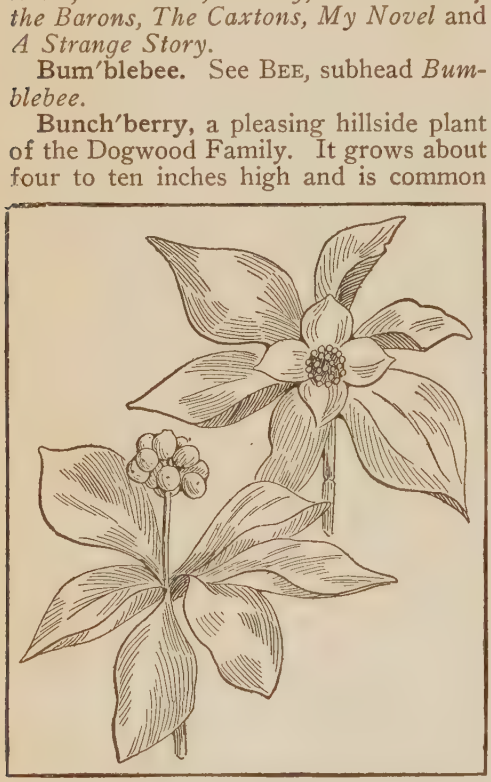
Bülow, *fon Bu'lo,* **Friedrich Wilhelm,** Baron von (1755-1816), a German general. He commanded the German army at the Battle of Möckern, an engagement which revived the drooping spirits of the soldiers after the defeat of Lützen. He defeated Marshal Ney at Dennewitz, thus saving Berlin, had a large share in the victory of Leipsic, and ended the campaign of 1814 by the capture of Montmartre. He was rewarded by an estate and the title of Count of Dennewitz. In 1815 he hurried to join Blücher and was at the head of the troops that brought such timely aid to Wellington at the Battle of Waterloo (See Waterloo, Battle of).

Bul'wer-Lyt'ton, Edward George Earle (1803-1873), first Baron Lytton, an English novelist and politician, born in London. He graduated at Cambridge in 1826 and was elected to Parliament in 1831, serving until 1842. During this period he published some of his most popular works. He traveled on the Continent, returned to Parliament in 1852 and was colonial secretary in 1858-59. In 1866 he was created a baronet as Baron Lytton. His novels reveal an intimate knowledge of the society in which he moved, as well as accurate historical research. The plots are carefully con-

structed, but his language and sentiments are often exaggerated and artificial. *The Last Days of Pompeii* and *Rienzi* represent his best work. Other productions are *Pelham, Lady of Lyons, Paul Clifford, Ernest Maltravers, Alice, or The Mysteries, Richelieu, Money, The Last of the Barons, The Caxtons, My Novel* and *A Strange Story.*

Bum'blebee. See BEE, subhead *Bumblebee.*

Bunch'berry, a pleasing hillside plant of the Dogwood Family. It grows about four to ten inches high and is common



BUNCHBERRY

from Maine to California, mostly in rocky soil. The deeply-veined leaves are broad and form a pleasing background for the flowers, which are tiny greenish-white blossoms, further enhanced by four pure white bracts which might be mistaken for the petals, and which give the flower heads a somewhat rectangular appearance. The blossoms are followed by a "bunch" of bright red berries, which gives the name to the plant. It is sometimes locally called pigeonberry. It blooms from May till July.

Bun'ker Hill, Battle of, one of the most important of the early events of the Revolutionary War, fought on June 17, 1775. Ten thousand British troops under generals Gage, Howe, Clinton and Burgoyne were occupying Boston. The American force of from 15,000 to 20,000, commanded by Gen. Artemas Ward, were drawn up in a semicircle, some 16 m. long, stretching from Cambridge to Charlestown Neck. The Americans learned that Gage planned to occupy Bunker Hill and Dorchester Heights to the north and south of Boston, respectively, and they decided to forestall him. Consequently, on the night of June 16, Colonel Prescott with 1200 men fortified Breed's Hill, though he had been ordered to take the adjoining Bunker Hill. The British discovered the operation at daybreak and opened fire from their ships in Charlestown harbor. Later 3000 men under Howe, instead of being ordered to take Charlestown Neck, which was the one retreat open to the Americans, had to advance upon them, only to be utterly routed. A second charge, during which Charlestown was burned, was even more costly for the English, who, nevertheless, made a third determined assault. But the Americans had exhausted their ammunition. After resisting for a time with stones and with their gunstocks, they were driven back. The Americans lost about 500 men, among these being Gen. Joseph Warren, one of the most prominent patriots of New England. The British loss was about 1000, including 89 officers, of whom Major Pitcairn was one. The English victory enabled Gage to occupy Boston nine months longer; but this did not discourage the Americans. Instead, the battle gave them increased courage, for, until disabled by lack of supplies, they had shown that they were more than equal to the enemy.

Bunker Hill Monument, a monument erected to commemorate the Battle of Bunker Hill, on the battlefield on Breed's Hill, now Bunker Hill, Boston. It was begun in 1825, the corner stone being laid by Lafayette, and Daniel Webster delivering the famous oration of that occasion. The last stone was raised to its place mid great rejoicing on July 23, 1842, and on June 17, 1843, Webster de-

livered the dedicatory address. The monument is of granite, and was designed from a wooden model by the sculptor, Horatio Greenough. Its base is 30 ft. square, and it is 220 ft. high, there being a room at the top which is reached by a spiral staircase and from which an extended view can be obtained. The cost of the monument was defrayed by popular subscription, though for a period of almost 20 years the work stood unfinished for lack of funds.

Bun'sen, Robert Wilhelm (1811-1899), a German chemist born at Göttingen, and a graduate of the university of that city. He became a teacher of chemistry and for 37 years occupied the chair of chemistry at Heidelberg University. He attained his fame as a chemist through his researches concerning arsenic and arsenic poisoning. Among his most noted achievements are the invention of the carbon-zinc, or Bunsen, electric cell; the Bunsen burner for laboratory use; and the elaboration of spectrum analysis, by which he was enabled to isolate the elements, cæsium and rubidium. Bunsen's work was wholly along the line of practical experiment, and he took little part in the discussions of chemical theories; for this reason his work is of permanent value in scientific and commercial lines.

Bunsen Battery. See ELECTRIC BATTERY.

Bunsen Burner, a kind of gas lamp named for its inventor, Prof. R. W. Bunsen of Heidelberg. It consists of a cylindrical tube four or five inches long, mounted upon a flat standard. At the lower part of the stem is an opening for the admission of air; an adjustable diaphragm regulates the amount of air to be admitted. Another opening at the bottom may be fitted with a tube for the entrance of the gas. The air supports the combustion of the gas, which burns with a pale but intensely hot flame at the top of the stem. The character of the flame is altered by the amount of air admitted. The Bunsen burner is used chiefly in laboratories.

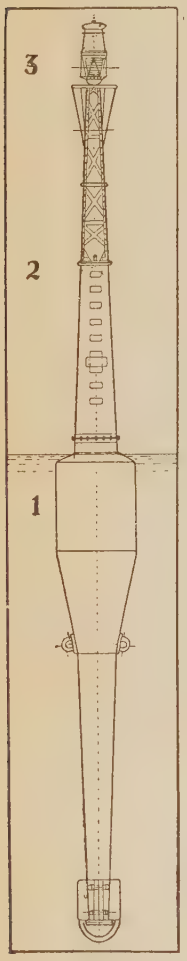
Bunt'ing, a name applied to several members of the Finch Family. The European bunting is the cirl bunting and is about the size of the canary. The throat is blackish-green, with a yellow patch; the crown is yellowish-gray; the back is brownish-orange; the wings are dark brown; the tail is brown with white markings; the breast and under parts are greenish-gray, brownish-orange and yellowish. The nest is placed in a bush and is made of grass, lined with hair. The eggs are brown-spotted. In America, the indigo bunting and dickcissel are examples of buntings. Several birds belonging to other families are erroneously called buntings. See DICKCISSEL.

Bun'yan, John (1628-1688), an English author, born in the village of Elstow, near Bedford. He spent his youth working at his father's trade of tinker, and served for a time in the Civil War, probably on the side of Parliament. About 1648 he was married to a devout woman through whose influence he experienced conversion, and in 1653 he joined the Nonconformists. Being formally recognized as a preacher in 1657, he soon became quite generally known among the midland counties, persisting in his preaching after the Restoration, when to conduct divine worship except in accordance with the forms of the Established Church was illegal. Bunyan was therefore confined in the Bedford Jail for 12 years (1660-72) and again in 1675 for six months. After his release from prison he resumed his preaching, continuing in this until his death.

It was while he was confined in jail that Bunyan produced his great masterpiece, *The Pilgrim's Progress,* an allegory that combines the charm of the novel, the fairy tale and the romance of adventure. *The Pilgrim's Progress,* the first part of which was published in 1678, is a forerunner of the novel of the next century, and is justly admired for its realism, simplicity and vigor. The author's style here is perfectly adapted to his theme, as he describes in quaint and graphic phrases the familiar wayfarer along the journey of life, or is moved by the beauty of his vision to

lyrical and tender language. Bunyan's other writings include *The Life and Death of Mr. Badman, The Holy War* and *Grace Abounding,* the last an account of the author's spiritual experiences.

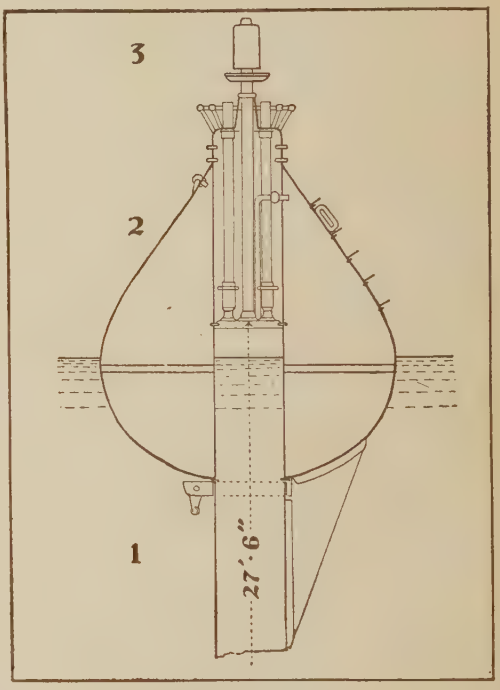
Buoy, *Boy,* a floating object moored, wherever necessity seems to require, as a guide to navigation. A pole or log with a heavy weight on the larger end, by which also it is anchored, is called a spar buoy. Hollow, metal buoys are of various shapes, and are commonly made of sheet iron. Some buoys support whistles, operated by the waves, or bells rung with more or less violence, according to the action of the sea; others carry lamps, lighted by compressed gas, which are arranged to burn continuously for months without attention; while others carry electric lights connected with power houses by protected cables. Many are so painted as to convey detailed information to the navigator. Thus, in the United States *white* buoys mark anchorage or dumping limits and *green* indicate sunken wrecks, while quarantine buoys are painted *yellow;* and those which mark midchannel obstructions bear transverse stripes of *black* and *red.* On the starboard, or right-hand, side of a channel as one enters from the sea, *red* buoys are found; on the port side, *black.* Channel buoys are also numbered, from the sea, the odd numbers being on the port side. The *life* buoy now commonly used is a hollow ring of copper,



LIGHT BUOY

which carries a light visible at night for a considerable distance.

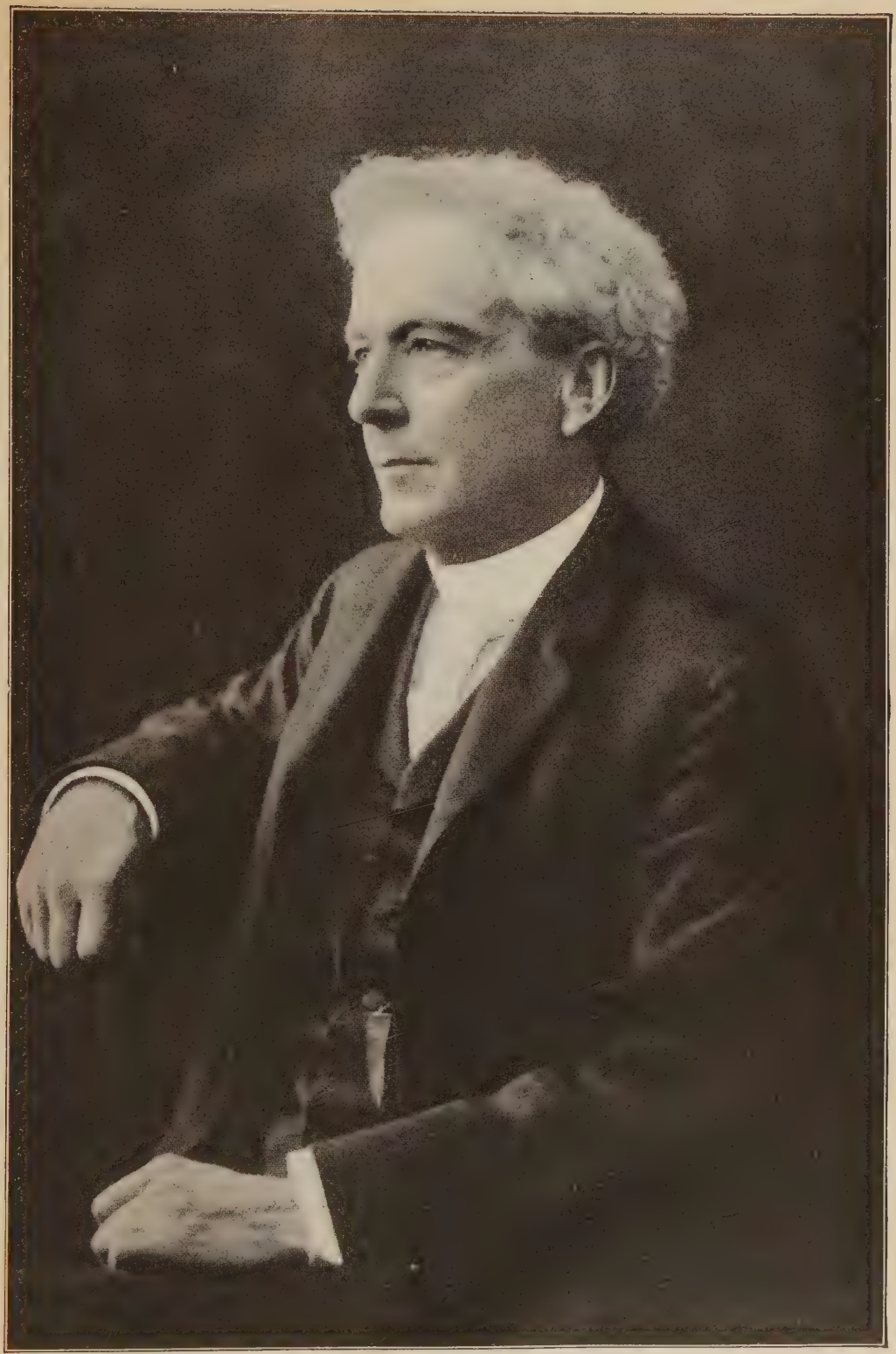
Bur'bank, Luther (1849-), an American horticulturist, born at Lancaster, Mass. He worked as a boy in his uncle's plow factory, but, although he showed inventive genius, he best enjoyed the moments spent in his uncle's gardens. His first work of note was the development of the Burbank potato, which he produced by planting the seeds borne in the seed boll of an Early Rose



WHISTLING BUOY

vine. In 1875 he moved to Santa Rosa, Cal., because the climate seemed more favorable for his work. There he has given his time to the study of the ways of nature and of the practical use that man can make of her methods.

Burbank is one of the best-known plant breeders in the world, and the good he has done is scarcely to be estimated. Not only has he produced new varieties of fruits and flowers having new flavors, new odors and new combinations of colors, thus adding to the great sum of the world's enjoyment and pleasure, but



LUTHER BURBANK

he has also added enormously to the world's economic wealth in the one production, the edible cactus, a forage plant that can grow luxuriantly upon the arid lands where other plant life fails. His achievements concern all lines of horticultural work. Among his most notable productions are the stoneless prune and the new beach plum. The latter was a somewhat tasteless wild plum but a prolific bearer; by being crossed with a garden variety, the new plum has become a hardy tree with rich fruit that is borne in great quantities. Aside from these, Burbank has originated fully 20 new varieties of prunes and plums and an equal number of improved berries. Under his labors fruits no longer have distinctive flavors; his new quince has a pineapple flavor; his plum-cot combines the flavor and appearance of the plum and the apricot; his plum-cherry has a new flavor; and his new walnut is a combination of the English walnut and the common black walnut. Through his efforts the flowering currant is being made to produce an excellent fruit, and the peach-almond is becoming a peach whose stone is an edible nut. The pomato is an edible berry, resembling the tomato but borne upon the potato vine. It may be eaten raw, cooked or preserved. Among his interesting productions, and one of great economic value, is the white blackberry, a shrub with luscious, translucent fruit and smooth, thornless stems.

Burbank's method has in it nothing of the miraculous. His work is all performed with great labor and only after a careful and painstaking study of nature's ways. To produce a new variety, he collects the pollen from the anthers just before it is ready to fall, by dusting it carefully upon a watch crystal. The pollen he carefully dries for a day before using it. When he is ready to apply the pollen to the flowers of the plant that is to produce the seed, he removes almost nine-tenths of the buds, so that the energy of the plant may go to the production of the new seeds. Just as the petals begin to show color he cuts away the sepals, petals and anthers, leaving the uninjured pistils, which are no temptation to the bees. With the tip of his finger he carefully dusts the dried pollen upon the pistil, and nature cares for its growth. Great patience, as well as skill, is required, for after the seed is mature sometimes years must elapse before it produces a plant old enough to bear fruit and to prove whether or not the experiment has been successful. Hybrid plants are very uncertain and there may be as many varieties produced as there were seeds planted; some of these varieties, though answering in every other respect, may be infertile and so practically useless. The plants that do not prove useful are immediately pulled and burned; this annual wholesale destruction of tons of vegetable matter was long incomprehensible to Burbank's neighbors who at first did not appreciate the nature of his work.

Personally Burbank is a pleasing man to meet. He has broad views and an exact knowledge, especially along his lines of work. He is naturally reserved, even timid in bearing, but to his friends he shows a geniality and an optimistic temperament that render him a choice companion and associate. Unlike most men of his type, he has rare business ability, although he has made no effort to become wealthy from his labors. Recently the Carnegie Institute placed at his disposal $100,000 for ten years. This provides for the recording of his experiments and the removal of any limitations to his work because of lack of means.

Bur'bot, a long, fresh-water Cod, found in Northern waters. It is recognized by its long dorsal fin and the sensitive feelers called barbels, of which there are two on the nose and two on the chin. The American species is not used as a food fish except in the Far North, where its skin is also valued because of its use for windowpanes. The burbot occasionally becomes six feet in length and attains a weight of 60 lb. The European burbot is used in salads or offered upon the market dried or salted. Both species are known as the ling, lawyer or eelpout.

Burdett'-Coutts, *Koots,* **Angela Georgina** (1814-1906), an English baroness and philanthropist, the daughter of Sir Francis Burdett. She used much of the wealth inherited from her grandfather in founding and endowing churches, schools and other institutions. Notable among her philanthropic enterprises are a South Australian establishment for the improvement of the natives, shelters and reformatories for fallen women, and Columbia Square, London, a collection of model dwellings. She accepted a peerage from the government and was the first woman to whom the freedom of the city of London was granted. In 1881 she was married to W. L. Ashmead-Bartlett, who, by royal license, took his wife's name. She is buried in Westminster Abbey.

Burdette, Robert Jones (1844-1914), an American clergyman and humorist, born in Greensboro, Pa. He received his education in the public schools of Peoria, Ill., and from 1862 to 1865 he served with the 47th Illinois volunteers, after the war finally becoming associate editor of the Burlington (Iowa) *Hawkeye,* in which connection he made his reputation as a humorist. Later he worked on the Brooklyn *Eagle* and in 1900 he began contributing editorials to the Los Angeles *Times.* Previously he had begun to lecture, in 1877, and he became a licensed minister of the Baptist Church in 1887. His writings include *The Rise and Fall of the Mustache, Hawkeyes, Chimes from a Jester's Bells, Smiles Yoked with Sighs* and the poems, *The Silver Trumpets.*

Bur'dock", a rough, coarse weed of the Composite Family, common in waste lands, roadsides and fields all over the United States and Canada. The root is long and tough, and from it rises a coarse, thickened stem, bearing at the base large heart-shaped leaves, and above, smaller oval ones. These leaves are all closely covered with fine hairs and are light green in color. The flowers, which blossom all summer, are borne in heads surrounded by an involucre of short-hooked appendages. These form the bur, which, when ripe, clings by means of its tiny hooks to the fur of animals, clothing of people or even the feathers of birds, and in this manner the seeds are distributed. The burdock is one of our many weeds which was brought here as a medicinal herb and has spread with such rapidity as to have become a nuisance. The prickly burs are made by the children into balls and other devices, but aside from this and its use by a few herb doctors, the burdock is of little value. There are two common varieties of burdock known in the United States, the main distinguishing feature being the difference in size and ruggedness.

Bureau of American Republics. See PAN-AMERICAN UNION, BUREAU OF.

Burgess, *Bur' jes,* **Thomas Joseph Workman** (1849-), eminent Canadian physician, born in Toronto and educated at Upper Canada College and Toronto University. He was appointed surgeon to her Majesty's British North American Boundary Commission, in 1872, and served with such efficiency as to receive special thanks from the government. He now made a particular study of mental diseases, and in 1875 accepted the position of assistant physician of the London Asylum for the Insane. In 1887 he was assistant superintendent of Hamilton Asylum; and since 1890 he has been medical superintendent of the Protestant Hospital for the Insane at Montreal. Dr. Burgess was made a fellow of the Royal Society of Canada, 1885; lecturer on mental diseases at McGill University, 1893; honorable secretary for the Dominion of Canada of the Pan-American Medical Congress, Mexico, 1896; professor of mental diseases, McGill University, 1899; and president of the American Medico-Psychological Association, 1904-5. He has written numerous valuable books pertaining to the science of medicine and the history of institutions for the insane in Canada.

Burgoyne, *Bur goin',* **John** (1722-1792), a British general in the American Revolution, educated at Westminster.

He entered the army while very young, and, in consequence of his marriage with the daughter of the Earl of Derby, was promoted until, in 1758, he became lieutenant-colonel of the foot guards. In 1762 Burgoyne won distinction as brigadier-general in Portugal, and, having served in America in 1775-1776, returned early the following year in command of an army which was to march from Canada through New York and thus divide the American Confederacy. On July 6 he captured Ticonderoga, for which he was made a lieutenant-general; but on Aug. 16 Stark defeated a part of his army at Bennington, and on Sept. 19 and Oct. 7, he himself suffered defeats at Stillwater. In consequence he surrendered his entire army to Gates on Oct. 17, and with Washington's permission returned to England, where he was coldly received, being refused audience of the King or a court-martial.

Burgoyne finally resigned his command; but when the ministry changed, in 1782, he was not only restored but was given a colonelcy, and appointed commander-in-chief in Ireland and a privy councilor. After 1783 he retired to private life, devoting most of his time to writing comedies. He managed the impeachment of Warren Hastings in 1787. He was buried in Westminster Abbey. See BENNINGTON, BATTLE OF; SARATOGA, BATTLES OF.

Bur'gundy, a large province formerly belonging to France. It was named from the Burgundians, a Teutonic tribe that established a kingdom in the Rhine basin in 408 A. D. They came under the control of the Franks, and in 843, by the Treaty of Verdun, the country was divided. In 933 the divided parts, with additional territory, were united under the name of the Kingdom of Arles. In 1032 the kingdom became a part of the German Empire. When the Kingdom of Arles was formed in 933, the northwestern part became a separate duchy, under the sovereignty of the French kings. This duchy retained the name of Burgundy and grew in size and importance until its last duke, Charles the Bold, conceived the plan of raising it to the rank of a kingdom between France and Germany. His ambition led to his defeat, and when he died in 1477 the duchy was seized by Louis XI and made a part of France.

Burial, *Ber' i al,* a manner of disposing of the bodies of the dead. Among savage races the corpse is often given over to birds of prey or wild animals. The ancient Egyptians embalmed the bodies and preserved them in tombs; the Hindus formerly threw many of them into the Ganges River, believing it to be a sacred stream. Among the Greeks and Romans arose the practice of interment and cremation. The modern method is more often interment in the ground or in a tomb or vault overground, rather than cremation. When intrusted to the care of the Church, the burial generally takes place in ground consecrated for the purpose and subject to municipal control. See CATACOMBS; CREMATION; MUMMY; SARCOPHAGUS.

Burke, *Burk,* **Edmund** (1729-1797), a British philosopher and statesman. He went to London in 1750 to prepare for the English bar, but legal studies proved distasteful to him. He achieved a reputation as a writer by his famous *Vindication of Natural Society* and by a philosophic treatise which aroused attention in England and Germany. He went to Ireland as private secretary to W. G. Hamilton in 1761, but returned to London two years later and joined the celebrated Literary Club the next year.

In 1765 Burke began public life as secretary of Lord Rockingham, then the prime minister of England. He favored the American colonies in their struggle with the Mother Country, and his speeches on *American Taxation* and *Conciliation with America* were among the greatest oratorical efforts of the time. Burke was a man of independent views and he twice lost his seat in Parliament because he would not be the tool of the others. He was twice appointed paymaster for short terms when his party was in power. In his celebrated oration against Warren Hastings he revealed his

vast knowledge of affairs in India and a generous sympathy for her oppressed people.

When the excesses of the French Revolution began, his reverence for the established order of things led Burke to write his *Reflections on the French Revolution,* a work which proved of the greatest service to the reactionary party in Europe. He severed his long friendship with Fox because of their difference of opinion on this question. His later writings against the French Revolution were of little value. He retired from Parliament in 1794.

Bur'lington, Iowa, a city and the county seat of Des Moines Co., 206 m. s.w. of Chicago, on the right bank of the Mississippi River and on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Toledo, Peoria & Western and other railroads. The river, which is here broad and deep, is spanned by the bridge of the Chicago, Burlington & Quincy Railroad. Steamboat lines connect the city with other important points on the river and an extensive river commerce is maintained. There are railroad repair shops here, also numerous manufactories, the principal products being lumber, furniture, desks, wagons, carriages, wheels, boxes, baskets, metallic burial caskets, machinery, Corliss engines, farming tools, crackers, pickles, flour, mattresses, brooms, screens, novelties, soap and sleigh bells. One of the most extensive industries is the manufacture of pearl buttons from river mussel shells. Pork packing and limestone quarrying also are engaged in.

Burlington lies in a sort of amphitheater, enclosed by limestone bluffs, which slope away from the river. The city contains numerous fine buildings, among them a courthouse, city hall, a Y. M. C. A. Building, the public library, the Tama Building, the post office and the German-American Savings Bank Building. It has a public library and hospitals. One of the chief attractions of the city is Crapo Park, a 100-acre pleasure ground lying along the river bank. The first permanent settlement was made here in 1833; a town was laid out in 1834 and named Flint Hills. The name was soon changed to Burlington, after the city of the same name in Vermont, and in 1837 the town was incorporated; it was chartered as a city the following year by the Territory of Wisconsin, and by the Territory of Iowa in 1839 and 1841. Population in 1920, U. S. Census, 24,057.

Burlington, N. J., a city and port of entry of Burlington Co., 11 m. s.w. of Trenton and 18 m. above Philadelphia, on the Delaware River and on the Pennsylvania Railroad. The river at this point is nearly a mile wide and separates the city from Bristol, Pa. Burlington is a trade center for surrounding towns and has an extensive industry in garden and dairy produce. Its educational institutions are St. Mary's Hall (Protestant Episcopal), the oldest Church school for girls in the country, and Burlington College. St. Mary's Church, endowed by Queen Anne, and the State Masonic Home are located here. It was settled by Friends in 1677 and named New Beverly, but the name was subsequently changed to Burlington. The city was for many years the seat of government of West Jersey and was the residence of the last colonial governor, William Franklin. Burlington has manufactories of stoves, shoes, structural iron, typewriter supplies, silk, carriages, canned goods, etc. It received its first city charter in 1733 and in 1784 a new charter was issued. Population in 1920, 9,049.

Burlington, Vt., a port of entry, the most populous city of the state, and county seat of Chittenden Co., 40 m. n.w. of Montpelier and 80 m. by water n. of Whitehall, N. Y., on the Central Vermont and Rutland branch of the New York Central Railroad. The city is finely situated on the eastern shore of Lake Champlain, west of the Winooski River. It is surrounded by magnificent scenery and is built on an eminence which commands beautiful views of the Adirondack Mountains and a wide expanse of the lake. The environment is agricultural. There is a large lake com-

merce. Burlington is one of the largest lumber markets in the United States, the product being brought principally from Canada. There are also extensive quarries of limestone, marble and other building stone in the vicinity. The Winooski River furnishes water power for manufacturing purposes. There are machine shops, large planing mills and manufactories of cotton and woolen goods, flour, cereal foods, furniture, refrigerators, brushes, patent medicines, paper and other goods.

Burlington is the seat of the University of Vermont, founded in 1791, and of the affiliated Vermont State Agricultural College, founded in 1865. Other educational institutions are the Vermont Episcopal Institute and St. Mary's Academy. There are also many benevolent institutions, which include the Mary Fletcher Hospital, Home for Aged and Friendless Women, Lake View Retreat, Louisa Howard Mission, Providence Orphan Asylum and several sanitariums. The city is the see of a Roman Catholic bishop. The Billings Library is one of the most notable buildings. The town was settled in 1773 and was a garrisoned post during the War of 1812. It was chartered as a city in 1865. Green Mount cemetery overlooks the Winooski Valley and contains the grave of Col. Ethan Allen. Population in 1920, 22,779.

Bur'ma. See INDIA.

Burne-Jones, Sir Edward (1833-1898), an English painter. Entering Oxford with the idea of taking orders, he studied for the Church, but came under the influence of Rossetti and decided to study art. He was an idealist and belonged to the Romantic School of Pre-Raphaelites, a brotherhood of artists who derived their inspiration from painters before Raphael. His pictures exhibit a variety of themes and are remarkable for ideality of conception, beauty of design and loveliness of color. Among the most pleasing of them are *Venus's Mirror, The Golden Stair, Wine of Circe* and *Legends of Briar Rose.*

Burn'ett, Frances Eliza Hodgson (1849-), an American novelist, born in Manchester, England. Her family came to Knoxville, Tenn., in 1865, two years later she began writing for magazines, in 1873 she married Dr. L. M. Burnett and in 1875 she settled in Washington. Her second marriage, to Stephen Townsend, an English surgeon, occurred in 1900. Among her many works are *That Lass o'Lowrie's, Louisiana, A Fair Barbarian, Through One Administration, Little Lord Fauntleroy,* probably her most successful work, *Sara Crewe, The Pretty Sister of José, A Lady of Quality, The Shuttle, The Dawn of Tomorrow* and *The Secret Garden. Little Lord Fauntleroy, A Lady of Quality* and *The Dawn of Tomorrow* are among the author's works which have been successfully dramatized. In preparing some of her plays she has worked in collaboration with Mr. Townsend.

Burnham, *Burn' am,* **Daniel Hudson** (1846-1912), an American architect, born in Henderson, N. Y. He was educated in Chicago and in Massachusetts and received honorary degrees from Harvard, Yale, Northwestern and Illinois universities. After the Chicago fire of 1871, he entered into partnership with John W. Root, and the two architects became famous as developers of the skyscraper, changing the sky line of Chicago. In 1891 the firm became D. H. Burnham & Co. Mr. Burnham was made chief architect of the Columbian Exposition held at Chicago in 1893, and here he revealed a sense of beauty, wealth of imagination and breadth of vision that made the exposition the beginning of a new interest in architecture. He was the chief rebuilder of San Francisco, the designer of such well-known buildings as the Rookery, Masonic Temple, Continental-Commercial Bank and Field's retail store in Chicago, the Flatiron Building in New York and Selfridge's store in London, and made the plans for beautifying Washington, Chicago, Cleveland, Brooklyn and other large cities. Mr. Burnham was a member of several art organizations and of the National Institute of Arts and Letters.

Burnham, Sherburne Wesley (1838-1921), an American astronomer, born at Thetford, Vt., and educated at the academy there. While a young man he was engaged as a stenographer. Later he was for several years clerk of the United States Circuit Court for the Northern District of Illinois. While serving in this office he spent much of his spare time in studying the heavens, becoming an amateur astronomer of distinguished ability. When the Lick Observatory was completed he went there, and later to Yerkes Observatory, as professor of practical astronomy. Burnham has discovered and catalogued more double stars than any other man. In recognition of his services in this field he has been awarded the gold medal of the Royal Astronomical Society of England.

Burns, Robert (1759-1796), the foremost Scottish poet, born in Alloway, Ayrshire. His parents were poor, but intelligent, God-fearing peasants, who did what they could to give the seven children an education. Robert's schooling was meager, but he was an eager reader and learned numerous Scottish songs and ballads, so that one day while plowing his father's fields he formed the well-known wish:

"That I for poor auld Scotland's sake
Some useful plan or book could make,
Or sing a sang at least."

By the time he was 16, the poet was doing a man's work, trying, without success, to keep the family in comfort. In 1784 the father died. Two years later, discouraged by poverty and an unfortunate love affair, Burns decided to emigrate to Jamaica. In the meantime, however, he had gained considerable local fame by the poems he had been composing for the last ten years, and these he had published to raise money for his voyage. The great success of the volume, which contained *The Cotter's Saturday Night, To a Mouse* and *To a Daisy,* changed his plans, and the winter of 1786-87 was spent in Edinburgh, where he was welcomed, feasted and patronized, and where Walter Scott, then a lad of 15, saw him and "would have given the world to know him."

In 1788 Burns settled on a farm at Ellisland on the Nith, married Jean Armour and wrote, among other poems, *Auld Lang Syne.* The following year he was appointed excise-officer of the district and in 1791 was removed to a more lucrative post at Dumfries. Shortly afterwards, he contributed about 100 songs to a collection of Scottish airs compiled by George Thompson, receiving as his compensation a shawl for his wife, a picture and £5. Of the following years there is little to record. Drudgery and poverty made him lose heart, bad companions and dissipation aided in his downfall and he died in his 38th year, self-defeated and embittered.

In his relation to the progress of British literature, Burns may be regarded as the link between two eras, being the most influential of that group of 18th century poets who paved the way for the outburst of song of the Romantic Period. Like the Romantic poets he wrote spontaneously and sincerely of his personal feelings and of the beauties of nature, but he surpassed them all in the gift of pure song. Absorbing the rich stores of Scottish minstrelsy, the gift of several centuries, he gave back to Scotland the richer fruits of his own genius, "making every chord of her life to vibrate," singing as no one else had, of the glory of her wars, the beauty of her landscapes and the strength of her sons. His poetry reveals the qualities of the man himself, —his love for the "modest, crimson-tipped flower," or the little mouse whose home has been destroyed by his plowshare, his racy humor and liking for fun and frolic, his hatred of hypocrisy and his appreciation of the simple peasant life which is "blest with health, and peace and sweet content."

Burns and Scalds. These are injuries produced by contact of the human body with excessive heat. If serious they should receive prompt and careful attention, as numerous disorders, such as inflammation of the bowels, lockjaw, pneumonia and congestion of the brain,

have been known to result from the injury. In the case of shivering or exhaustion a stimulant may be given. A local application which is highly beneficial is carron oil prepared by mixing equal parts of limewater and olive oil. Blisters may be opened to remove the water by pricking them carefully with a needle, which should be sterilized by dropping it in boiling water, before the operation.

Burn'side, Ambrose Everett (1824-1881), an American soldier, born in Liberty, Ind., and educated at West Point. In 1847, as second lieutenant of third artillery, he accompanied General Patterson to Mexico. Later he had charge of a squadron of cavalry in New Mexico and was quartermaster of the Mexican Boundary Commission, resigning his commission in 1852 to engage, in Rhode Island, in the manufacture of firearms of his own invention. He was an officer of the Illinois Central Railroad Company at the outbreak of the Civil War, into which he went as colonel of the first Rhode Island volunteers, serving at the first Battle of Bull Run. Later, as brigadier-general of volunteers, at Annapolis, Md., he organized a "coast division" for duty along the lower Potomac and Chesapeake Bay, and in February, 1862, he commanded at the capture of Roanoke Island, whereupon he was transferred, from the Department of North Carolina to the Army of the Potomac, rendering valuable service as a corps commander at South Mountain and Antietam. After the Battle of Antietam Burnside superseded McClellan in command of the Army of the Potomac, to be himself relieved by Hooker after the defeat of Fredericksburg, December, 1862, and assigned to the command of the Department of the Ohio. In August, 1863, while fortified for a siege at Knoxville, he was relieved by Sherman; but later with his old corps, the ninth, he did valuable work in Grant's campaign against Richmond. Following the war Burnside had various railroad interests, was governor of Rhode Island for three terms, and from 1875 until his death sat in the Senate.

Bur'pee, Lawrence Johnstone (1873-), an author and librarian, born in Halifax, Nova Scotia. Entering the civil service in 1890, he was private secretary to the Honorable Dickey, to Sir Mowat and to the Honorable Mills; in 1905 he was appointed librarian of the Carnegie Public Library, Ottawa. He is the author of *Search for the Western Sea, By Canadian Streams, A Century of Canadian Sonnets* and *Songs of French Canada.* Among his other works have been contributions, chiefly on Canadian subjects, to various English and American reviews, and leading articles for the *Encyclopædia Britannica* and for the *Encyclopædia Americana.*

Burr, Aaron (1756-1836), an American soldier and politician, born at Newark, N. J. He was a grandson of Jonathan Edwards. He graduated from Princeton in 1772 and joined the patriot army in 1775. Here he gained a high reputation for courage and daring, and rose to the rank of lieutenant-colonel. Resigning his commission in 1779 on account of his health, he studied law and was admitted to the bar in 1782. He quickly attained success in his profession, became a member of the New York Legislature in 1784, was made attorney-general of the state in 1789, and was elected to the United States Senate in 1791 as a member of the Republican, or Anti-Federalist, Party.

Burr tied Thomas Jefferson in the electoral vote for the presidency of the United States in 1800, but the House of Representatives chose Jefferson, Burr becoming vice-president. He was defeated for the governorship of New York in 1804. Both of these defeats he charged to his great rival, Alexander Hamilton, some of whose derogatory statements appeared in public print. Burr challenged Hamilton to a duel, which was fought July 11, 1804, and resulted in the mortal wounding of Hamilton. Burr was indicted for murder and fled to South Carolina, but after the excitement had subsided he returned to Wash-

ington and resumed his duties as vice-president. His popularity, however, was gone and his political fortunes blasted.

After completing his term of office he turned his attention to the Southwest and prepared to raise an army for the conquest of Texas and the establishment of a republic of which he was to be the head, apparently with the expectation that the Southwestern States of the Union would also join. His plans were publicly denounced and he was arrested in 1807 and tried for treason, but was acquitted. He went abroad, where he was discredited, and returned in 1812, resuming his law practice in New York. Although he gained considerable practice, he was shunned by society and died in poverty.

Bur'ritt, El'ihu (1810-1879), an American reformer, known as "the learned blacksmith," born in New Britain, Conn. At 16 he was apprenticed to a blacksmith; but he studied in spare moments and mastered Greek and Hebrew and other languages. In 1846 he went to England, where he formed the League of Universal Brotherhood to abolish such evils as war and slavery; later the first International Peace Congress was held under his guidance at Brussels, and in 1865 he became consul for the United States at Birmingham. He wrote *Sparks from the Anvil* and *Chips from Many Blocks.*

Burroughs, *Bur' oze,* **John** (1837-1921), an American essayist, naturalist and poet. He was born on a farm at Roxbury, N. Y., and received an academy education. After eight years' service as a teacher and some experience in journalistic work in New York, he was clerk in the treasury department at Washington from 1863 to 1873, when he was appointed national bank examiner. Since 1873 he has resided on a farm at Esopus, N. Y., and since 1884 has given his entire attention to fruit culture, to the study of nature in its varied forms and to literature. In 1903 he made a careful study of animal life in the Yellowstone National Park. Burroughs is considered the successor of Thoreau as a writer upon the life and habits of plants and animals. From boyhood he has loved the open country. In his bark-covered study on the Hudson, he has penned in his easy and familiar style many of those delightful and fascinating papers which charm the lover of nature in every clime and have borne rich fruitage in the life of the nation and the race. His works include *Wake Robin, Birds and Poets, Winter Sunshine, Fresh Fields, Bird and Bough* and *Ways of Nature.*

Bur'ton, Ernest De Witt (1856-), an American Biblical scholar and educator, born at Granville, Ohio. He was educated at Denison University, Rochester Theological Seminary and in Germany. After teaching for several years in the public schools and at Rochester, he became associate professor, in 1883, and later professor of New Testament interpretation in Newton Theological Institution. He remained here until 1892, when he became head of the similar department at the University of Chicago. He is also director of the university library, editor-in-chief of the *Biblical World* and editor of the *American Journal of Theology.* Dr. Burton has exerted wide influence as teacher, lecturer and writer on New Testament subjects.

Bur'wash, Nathaniel (1849-), a Canadian educator, chancellor of Victoria University, Toronto, born at Argenteuil, Quebec. He studied at Victoria College, Coburg, Yale University and the Garrett Biblical Institute at Evanston, Ill., and was ordained to the ministry in the Methodist Episcopal Church in 1860. In 1866 he accepted a chair in the faculty of Victoria College, in 1873 was elected dean of the theological department, in 1887 was made president and chancellor of Victoria University and during 1874-1886 he was secretary of education for the Methodist Church in Canada. In 1889-1890 he was president of the Methodist Conference. Burwash was a member of several general conferences and of the Council of Education for the Province of Ontario. In 1902 he was made a fellow of the Royal Society

of Canada. He has written a *Manual of Christian Theology* and other works on theological subjects, as well as some biography and history.

Bur'ying Beetle, a family of large beetles which, in both adult and larval stages, feed upon decaying animal matter. The members of the family may be recognized by having the extremities of the antennæ enlarged into a sort of club. Their bodies are black, with dull, reddish spots upon the sheaths of the wings and upon the first segment of the thorax. These beetles have a keen sense of smell and often fly long distances to carrion. About it the beetle digs a pit, into which it falls, deposits the eggs and covers both eggs and carrion with earth. The scaly larvæ which hatch feed upon the carrion until ready to emerge. The burying bettles do great good in disposing of dead and decaying animal matter.

Bush'el. See WEIGHTS AND MEASURES.

Business, *Biz' i ness,* **College,** a school for the training of young men and women for commercial vocations. The courses of study include English, stenography and typewriting, commercial law, business arithmetic, bookkeeping and in some colleges Spanish and German. Some institutions have advanced courses leading to the degree of "certified accountant." Several of the leading colleges and universities have established schools of commerce in which the courses are equivalent to those in other departments of the institution. Graduates from these schools are thoroughly equipped for a business career.

So far as known, the first instruction in bookkeeping in the United States was given by Mr. R. M. Barrett in Cincinnati in 1846. Mr. Barrett combined other commercial subjects with bookkeeping and thus paved the way for the commercial college. Business colleges are now found in all cities, and most high schools have commercial departments.

Bus'tard, a name given to certain birds related to the cranes, which live for the most part on the open plains of southern Europe, Asia and Africa. A single species lives in Australia. These birds are usually very large, the great bustard being one of the largest of European birds. It is about 45 inches high. The male is reddish above, barred with black. A part of the wing is white, as is also most of the lower parts. The breast is reddish-brown, barred with black. The head is gray and the cheeks are ornamented with tufts of whiskerlike feathers. The female lacks these feather tufts and the chest bands. The nest is a slight hollow in the ground, in which the two or three large, spotted eggs are laid.

But'cher Bird, a bird of the Shrike Family. The butcher birds, or shrikes,

BUTCHER BIRD

are widely distributed throughout the Eastern and Western hemispheres, the former being the best represented, having about 50 species, while the latter possesses but two species. The shrikes are peculiar in being the only members of the perching birds, which have the habits of the hawks, pursuing and killing small Mammals, birds and insects. The peculiar habit of impaling these animals on thorns, or of placing them in a crotch in a tree, is thought to be either for stor-

age or more easily to tear them to pieces. There are two American species.

Northern Shrike. This species is common in the northern part of the United States and Canada and is a winter resident in the United States.

Northern Loggerhead Shrike. This is a smaller bird (nine inches in length). It summers in the northern part of the United States and winters in the southern part. The nest is very bulky and loosely made, and is placed in a bush or tree not far from the ground. It contains three to six greenish, brown-spotted eggs. Two broods are usually raised. These birds may be recognized by the peculiar hooked, hawklike bill. The body is gray, with a black stripe on each side of the face, black wings and black tail, with white outer feathers, which show conspicuously in flight.

Butler, Benjamin Franklin (1818-1893), an American lawyer and soldier, born at Deerfield, N. H. He graduated at Waterville College, Maine, in 1838, was admitted to the bar in 1840, and began practice at Lowell, Mass., in 1841. He gained a great reputation as a lawyer, especially in trying criminal cases. In 1853 he became a Democratic member of the Massachusetts Legislature. At the beginning of the Civil War he was appointed brigadier-general of volunteers, and was made major-general a few months later. While occupying Baltimore he refused to surrender runaway slaves to their masters, claiming that they were contraband of war; hence the designation "contrabands" applied to them during the war. In 1862 he occupied New Orleans and administered affairs there with such vigor that he incurred the indignant enmity of the citizens and a proclamation of outlawry from President Davis. Later he commanded in Virginia and North Carolina, but was removed from command by General Grant shortly before the close of the war.

Returning to Massachusetts, he was elected to Congress as a Republican in 1866, where he served until 1879, except for the term 1875-77. He was prominent in reconstruction plans and in the impeachment of Andrew Johnson. In 1882 he was elected governor of Massachusetts on the Democratic ticket, and in 1884 was the unsuccessful candidate of the Greenback Labor Party for president. Butler was an able and forceful man, but sometimes erratic and arbitrary.

Butler, Nicholas Murray (1862-), an American educator, born at Elizabeth, N. J. He graduated at Columbia University in 1882, and, after taking special courses in Berlin and Paris, returned to his alma mater as an assistant in philosophy. Later he was made a professor, then dean of the faculty of philosophy; and, in 1902, by unanimous vote, president, succeeding Seth Low, mayor-elect of New York. Dr. Butler founded, and was the first president of, the New York College for the Training of Teachers. This institution has since been incorporated in Columbia University. Through his influence as a member of the New Jersey State Board of Education (1887-1895), manual training was introduced into the public schools of that state. He has served the National Education Association as president, and in many other ways. He is a frequent contributor to educational periodicals, but is known especially as the editor of *The Educational Review*, *The Teachers' Library*, the *Great Educators* series, *Columbia University Contributions to Philosophy and Education* and *Monographs on Education in the United States*. Dr. Butler is also actively interested in state and national politics, and was chosen to succeed Vice-President Sherman, whose death occurred in 1912.

Butler, Pa., county seat of Butler Co., 26 m. n. of Pittsburgh, on the Conequenessing Creek and on the Pennsylvania and the Pittsburgh & Western and other railroads. The town has woolen and silk mills and extensive manufactories of flour, plate glass, oil-well machinery, bottles, engines, steel cars, etc. Oil, natural gas, iron and coal are found in the vicinity. The town was settled in 1798 and incorporated in 1803. Population in 1920, U. S. Census, 23,778.

Butler, Samuel (1612-1680), an English satirist, born probably at Strensham, Worcestershire. It is thought that he attended Cambridge, and later he entered the household of the Countess of Kent. In 1660 he was appointed steward of Ludlow Castle by the Earl of Carbery. His chief poem, *Hudibras,* satirized the Puritans in witty couplets and well-directed jests, and it became immediately popular in Court, in the taverns and in the coffeehouses. Other brilliant satires were published in 1759, under the title of *The Genuine Remains, in Prose and Verse, of S. Butler.*

Butte, *Bute,* **Mont.,** county seat of Silver Bow Co., and largest city of the state, 65 m. s.w. of Helena and 26 m. s.e. of Anaconda, on the Union Pacific, the Great Northern, the Northern Pacific, the Oregon Short Line, the Butte, Anaconda & Pacific, the Chicago, Milwaukee & Puget Sound, the Chicago, Burlington & Quincy and other railroads. The suburbs of Walkerville, East Butte, South Butte, Williamsburg and Centerville are embraced within the limits of the city. Butte is situated on a high plateau between the Rocky and the Bitter Root mountains, 5800 ft. above sea level. There is a modern, electric street-car system with about 40 m. of track. The city is the center of the greatest copper-mining district in the world, and there are valuable deposits of gold, silver and zinc. The famous Anaconda copper mine is located here, and altogether about 150 mines are in operation. The streets of the city are broad and well paved. Columbia Gardens, a beautiful park, is maintained by William A. Clark.

Public Buildings. The noteworthy buildings include the county courthouse, Federal Building, Masonic Temple, a public library with 50,000 volumes, the Hirbour and Independent Telephone buildings, eight banks, modern hotels, the Silver Bow and Woman's Club buildings, 13 theaters and about 42 churches.

Institutions. Butte is the seat of the Montana School of Mines. Among the other educational institutions are a high school, about 25 public schools, the buildings of which cost nearly $1,500,000; a business college and parochial and private schools. A state industrial school is also located here.

Industries. Copper is the basis of Butte's prosperity, and the annual output equals about 30 per cent of the copper mined in the United States. Zinc and Silver are also mined here in larger amounts than elsewhere in the state, and the ore tonnage of the city is enormous. The mining interests total about $75,000,000 annually. The Washoe works at Anaconda, which are the greatest smelters in the world, are operated on Butte ore exclusively. Western Montana supplies millions of feet of timber for Butte mines. Electric power is furnished from Great Falls, Canyon Ferry, Madison Valley and Big Hole. Butte is an important commercial center and contains ironworks, foundries and machine shops, tile factories and extensive planing mills. Tributary to the city are some of the finest agricultural lands in the state.

History. Butte was first settled as a gold placer mining camp in 1864, but the place was of slow growth until the development of quartz mining in 1875. In 1879 it was incorporated by the Territorial Legislature and was made the county seat of Silver Bow County in 1881. Population of the city, according to the 1920, U. S. Census, 41,611.

But'ter, the fat of milk collected by churning. It forms the most important food fat known and is widely used in all temperate climates. The fat is found in the milk in the form of tiny round globules, whose walls must be broken down and a part of whose water content must be given up before they can be united in a familiar mass; these results the churning and working accomplish. Butter is sometimes made of fresh milk, but the ordinary method is to use only the cream, which contains almost all of the butter fat. Since the cream is lighter than the skim milk, they will separate readily if allowed to stand, but a quicker separation may be made by use of a cream separator,

which produces the same effect by means of centrifugal force. See CREAM SEPARATOR.

In making the butter the cream may be churned immediately or allowed to ripén; the latter method gives the ordinary market butter and is generally considered to produce butter of better flavor than the sweet-cream process. The cream during churning must be kept at a temperature of from 50° or 60° F. When the fat, containing a small per cent of water, casein, sugar, salt and acids, is collected, the buttermilk is drained off and the butter is salted and then worked to remove any remaining water and buttermilk and to spread the salt through it evenly. When necessary, coloring matter is added to render the butter of the same color throughout the year; otherwise that made in the spring and early summer, when the cows are feeding upon the fresh pasturage, is apt to be darker than that made at any other season. It is then packed in crocks or tubs, or molded into packages, generally of one pound each. Sweet-cream butter is seldom salted and contains more casein, water and fat than the sour-cream butter. In the United States the Pure Food Law requires that butter shall contain at least 82.5 per cent of butter fat. It requires three and one-half gallons of milk to make a pound of butter.

Butter was formerly produced in the United States on a small scale on almost all farms. At present the large dairy farms produce the most butter, the creameries furnishing little more than one-fourth of the total supply. According to the 1910 census the average yield in the United States and its estimated value is as follows:

From the farms.....	994,651,000 lb.	$225,544,000
From creameries and city dairies.....	624,765,000	179,510,000
	1,619,416,000	$405,054,000

This amount is largely produced in eight states, chief among which are, in the order named, Wisconsin, Iowa, Minnesota, Pennsylvania, Michigan, Ohio, Illinois and New York. The increase of butter production in the United States for ten years from 1900 was 8.6 per cent; the increase of factory-made butter was 48.7 per cent. Denmark has long led the world both in the quantity and quality of butter produced, but is now being rivaled by France and the United States.

Butter was first made from the milk of sheep and goats and was sold in a liquid form for use as an ointment as much as for a food. Old writings frequently speak of butter being poured. It was churned by shaking the milk in bottles, or sacks, made from skins, and was of exceedingly uncertain quality. Good butter now must be of rich yellow color, with a fresh but not decided flavor and no acidity or rancidness. In texture it should be firm and not salvelike. Butter of poor flavor is frequently sold to creameries where it is worked over and sold as *process butter;* such butter must, according to law, always be marked *renovated*. Butterine and oleomargarine are manufactured substitutes for butter. See CHURN; CREAMERY; MILK; OLEOMARGARINE.

But'tercup, a name applied to a number of species of the Crowfoot, or Buttercup, Family. All of these species are characterized by their watery juice and bright yellow flowers with many stamens. Our native buttercups are low herbs with much-divided leaves and rather brittle stems. They grow along moist banks or in meadows, where they may be found blooming early in the spring. Those introduced from Europe are even more common than the native buttercups. Among these latter is the tall buttercup, a familiar feature of our meadows and roadsides. This grows to a height of two or three feet and has rough, pale green leaves, coarsely divided. Another foreign species grows from a bulb. The buttercup is the Marybud spoken of by Shakespeare in the lark song in *Cymbeline,* and is the yellow gowan of Scotland.

But'terfield, Daniel (1831-1901), an American soldier, born in Utica, N. Y. He graduated from Union College in 1849, became brigadier-general of volunteers soon after the opening of the Civil

War and served in the Peninsula Campaign, at Fredericksburg, where he was corps commander, and at Chancellorsville, Gettysburg, Lookout Mountain and Missionary Ridge, where he was chief of the staff. At the close of the war he was brevetted major-general. Later he was for some years head of the New York City subtreasury.

But'terfly, one of the three classes of the order Lepidoptera. Members of this class are distinguished from the other two, the skippers and the moths, by differences of habit and structure. The wings of the butterfly are broad and generally brightly colored on both under and upper surfaces. When the butterfly is at rest, the wings commonly are held elevated or flutter with a continuous, palpitating movement, but are never folded as are those of the moth. The body is slender, and this is supposed to have some connection with the position of the wings, for the slender-bodied moths, the loopers, also hold their wings erect.

The antennæ of the butterflies are fully half the length of the forewings and are terminated by knobs or hooks. To the naturalist, the shape of the antennæ is a distinguishing feature of many families of the butterflies. Contrary to the habits of moths, the butterflies fly by day and rarely appear until the sun has dried the dew and warmed the air. They never fly in the rain and seldom on cloudy days. Thus they are commonly associated with golden days and bright flowers. The beauty of their coloring, the grace of their movements and brightness of the days in which they are seen make them to the insect world what the flowers are to the plant world. Their life, too, which is an incessant round of extracting nectar from the honey cups of the flowers, adds to the poetry of their existence. Probably no members of the animal kingdom are more spontaneously and more deservedly loved than are these dancing, joyous insects that flutter about the sunny fields and flower-covered roadsides.

The butterfly, like the moth, has passed through four stages of development. In its larval state it is called the caterpillar. Caterpillars of butterflies are rarely destructive or numerous enough to be annoying. See CATERPILLAR; MEASURING WORM.

Butterfly Weed, or **Pleurisy Root,** one of the common members of the Milkweed Family and, like all members of this family, characterized by a more or less milky juice and irregular flowers. The stem is coarse and straight, growing generally from one to three feet high, and is closely set with short-stemmed,

BUTTERFLY WEED

hairy leaves which are borne opposite each other. The flowers are deep orange in color and grow in thick, flat-topped clusters, which present a flaming patch of color along roadsides or railroad tracks in July and August. The plants generally are found growing in almost circular tracts in dry, light soils and often make their way into unkept dooryards, where, though called weeds, they are not, after all, a great nuisance. The individual flowers have an interesting

structure: the calyx and corolla are each divided into five parts and are covered by a crown, or "corona," under which lie the five stamens bearing on their summit the sticky masses of the fertilizing dust, called pollen, and at their base the honey-bearing cells which attract bees and insects. These visitors carry the pollen to their next stopping-place; there they rub it off upon the pistils which lie within the ring of stamens, and thus the plants are fertilized. Butterfly weed has less milky juice than most of the milkweeds, and its roots are put to use in medicines. Locally it is often called orange-root. See MILKWEED.

Butterine, *But' ter een.* See OLEOMARGARINE, *O" le\o mahr' gar een.*

But'ternut, or **White Walnut,** a tall tree of the Walnut Family known throughout the United States as far west as the Dakotas and south to Kansas. It is a straight tree with rough, furrowed bark and slender trunk. When growing in the forest it subdivides only at great height but in the open it is apt to branch lower. These branches are widespreading and give the tree a symmetrical form. The leaves are made up of from 12 to 19 yellowish-green leaflets, rounded at the base and having very finely-toothed edges. The leaflets turn yellow early in the autumn, and fall before the leaves of most other trees. The flowers are of two kinds: the staminate, which are to bear the pollen, or fertilizing dust, hang in long greenish-yellow catkins; and the pistillate, or fruit-producing, grow in short, few-flowered stalks. The fruit is a cluster of rugged, green-barked nuts, rather long and pointed at one end and thus easily distinguished from the black walnut, which is almost spherical in form.

The wood of the butternut is light and is used for furniture and the interior woodwork of houses. The nuts are sweet and oily and a valuable food product in regions where the trees are found. Their juicy husks contain a coloring matter, which is used to produce a yellow or brown stain.

But'terwort, an aquatic or marsh plant of the Bladderwort Family and quite closely resembling the true bladderworts. The name given to this family refers to the peculiar little air cells or bladders situated at the base of the root leaves which enable the plant, if near the water, to break from its moorings and float down the stream to new, if not more satisfactory, surroundings. The butterworts are more generally found in marshes and hence have less occasion to make use of their tiny life preservers; their name refers particularly to the fat, greasy leaves which form a broad tuft, at the base of the otherwise leafless flower stem. These leaves are wide and undivided; the flowers are borne singly on the stem and are small two-lipped blossoms. In the corolla or colored portion the lips are noticeably lobed, and the spotted lower lip is so much smaller than the upper that the flower has the appearance of a wide-open mouth. The flowers are violet in color and more or less hairy within.

Butterworts are found in the Southern States, Georgia, Alabama and Florida being the richest fields for their growth, though some are found as far north as the pine barrens of North Carolina. See BLADDERWORT.

But'terworth, Hezekiah (1839-1905), an American editor and writer, born at Warren, R. I. He received a common school education, traveled extensively in America and Europe, and from 1871 to 1874 was editor of the *Youth's Companion.* Among the books which he has published are the extended series of juvenile books, *Zigzag Journeys, A Knight of Liberty, The Boyhood of Lincoln* and *The Patriot Schoolmaster;* also, *Poems for Christmas, Easter and New Year, Poems and Ballads, In Old New England, Traveler Tales of China, Over the Andes* and *South America.*

But'ton, a knob or disk used chiefly to unite portions of wearing apparel by fitting into a hole formed for its reception, the two fastening together. They are used also as ornaments on clothing and in other ways. Buttons having loops or eyes are termed shank buttons, those

with holes in their center, hole buttons, while those made rough and afterwards covered with cloth are known as covered buttons. In their manufacture a large variety of materials are used, such as horn, hoof, bone, ivory, pearl, wood, glass, celluloid, gutta-percha, papier-mâché, pressed sawdust, leather refuse, wood, baked clay, marble, agate, jasper, amber, jade, gold, silver, brass, iron and steel. A button showing by its design or motto membership in some organization or fraternal order is sometimes worn. Buttons are also worn on the lapel of the coat by traveling salesmen to designate some accident-insurance company in which the wearer is a member. Many buttons are used during election times bearing the photographs of the candidates.

Buttonwood. See PLANE TREE.

Buz'zard, a bird of the Vulture Family. The turkey buzzard, or turkey vulture, is larger than a good-sized hen (about 30 inches long) and may be known by its brownish-black color and the red head and neck, which are bare of feathers, as in all members of this family. The buzzards are among the most useful of the birds of the South, effectually disposing of all dead animals, as they are all carrion eaters. It is thought that the buzzards locate the carcasses of dead animals entirely by sight, their sense of smell not being notably developed. Though somewhat awkward on the ground, in the air the buzzard is one of the most graceful of birds, soaring for hours with outstretched wings. No nest is made, the two eggs, spotted with brown, being laid on the ground in the woods or among rocks. The young birds are white when hatched and are covered with down; they are fed half-digested food which the parent bird raises from its crop. The turkey buzzard ranges from Saskatchewan to Patagonia.

Buzzard's Bay, a bay on the south coast of Massachusetts, separated in part from Vineyard Sound by the Elizabeth Islands, which bound it on the south. It is about 30 m. long and from 5 to 10 m. wide, and contains the harbors of New Bedford, Nasketucket, Sippican, Wareham and Mattapoisett. It has long been a favorite summer resort.

By-Law, a law made by any organization for the regulation of its affairs. In general, by-laws are merely agreements among the members of the organization as to methods of work, but in a municipal organization they are true laws and are commonly known as ordinances.

By'ron, George Noel Gordon, SIXTH BARON (1788-1824), an English poet, born in London. His father was a dissolute army captain; his mother, a passionate over-indulgent woman who treated her son alternately with fondness and contempt. Lord Byron—he succeeded to the title in his eleventh year—studied at Dulwich, at Harrow and at Cambridge, and became well versed in classic and English literature. His first volume of poetry, *Hours of Idleness,* appeared in 1807. Two years later, having taken his seat in the House of Lords, he sailed for the Continent and sojourned in Europe for two years, traveling east as far as Asia Minor. Of this journey he writes in *Childe Harold's Pilgrimage,* a series of cantos, published from 1812 to 1818, which fascinated London by their weird and melancholy strains. He married Miss Milbanke in 1815—she was not his first love—but the union proved unhappy and lasted only one year. After their separation unpopularity drove him out of England, and he left in 1816 never to return. He lived chiefly in Italy, wandered widely and wrote feverishly, striking out into new paths of wit and humor with startling success. The bulk of his work belongs to this period, including *Don Juan,* his masterpiece. In 1823 he sailed for Cephalonia to give aid to the Greeks in their struggle for independence, and he died of a fever the following spring.

Byron's place in English literature has been widely contested. At one time this proud and stormful poet was the object of admiration among his contemporaries; at another, subject to their contempt and scorn. Within the last two decades these varying estimates have been readjusted

and even the most sober critics are willing to grant him a place among the great poets of the world. Some of his loftiest passages are marred by a sudden descent to the commonplace; his melancholy has been suspected of being merely a pose; his verse is at times, when he is striving for the sublime, merely rhetorical. But there are themes—such as the sublimity of nature, the protest against hypocrisy and cant, freedom of life and of thought and the transitory value of human glory—with which he takes the heart of even the most disinterested reader by storm. Perhaps no other English poet, except Shakespeare, exerted so wide and permanent an influence on the literature of the Continent as did he. As a humorist, a satirist and an analyser of the heart of man he revealed his real strength. The works which have had enduring popularity are, aside from those mentioned, *English Bards and Scotch Reviewers, The Giaour, The Bride of Abydos, The Corsair, Manfred, The Prisoner of Chillon, Beppo, Cain, Werner, The Vision of Judgment* and *Sardanapalus.* Minor poems where rare beauty and delicacy rather than splendor prevails include *She Walks in Beauty, The Dream* and *Darkness.*

Byzantine, *Biz an' tin,* **Empire,** an ancient empire with its capital at Constantinople. It was also called the Eastern, or Greek, Empire, and began with the division of the Roman Empire at the death of Theodosius in 395 A. D. Arcadius received the Eastern Empire as his share, and proved a weak ruler.

During the minority of her brother Theodosius II (408-450), Pulcheria was regent and waged successful wars against the Persians. She was queen after her brother's death, and was followed by her husband, Marcianus. Then came Leo I, an obscure Thracian, who was followed by Zeno the Isaurian (474-491). The Goths under Theodoric were troubling the empire, and Zeno gladly listened to Theodoric's offer to lead his host against Odoacer in Italy. Zeno's reign is also marked by the fire at Constantinople, which destroyed over 100,000 manuscripts. His successor, Anastasius (491-518), built the long walls over the peninsula as a protection against the Bulgarians.

Justin I was followed by his nephew, Justinian I (527-565), and this reign marks the highest point of glory in the history of the Byzantine Empire (See JUSTINIAN). There were great reverses during the rule of Justin II (565-578), as the Avars and Persians were threatening the empire, and the Lombards gained nearly all Italy. Heraclius (610-641) was at first defeated by the Persians, but he dealt them at last a crushing blow at Issus. He was now forced to contend with the Moslems, and lost Syria, Judea and all of his African possessions in the struggle. The remainder of the empire was more closely united and from this time on it was more distinctly Greek in character.

During the eighth and ninth centuries came the controversy of the Iconoclasts (See ICONOCLASTS), which greatly weakened the country against the Mohammedans. The most violent period was under Leo III (717-741), who was an ardent Iconoclast. Image worship was restored by the Empress Irene. Her ambitious scheme to unite the Eastern and Western empires by her marriage with Charlemagne was not successful. The Bulgarians took Thrace during the reign of Leo V, and a little later the Moslems had taken Crete and Sicily. Under Basil II the Bulgarian Kingdom was changed into a Byzantine province (1018). By 1050 nearly all the Byzantine possessions in Italy had fallen to the Normans, and by 1078 the Seljuk Turks had gained nearly all of Asia Minor.

The advance of the Mohammedans brought on the Crusades (See CRUSADES) during the reign of Alexius Comnenus (1081-1118). In 1204 the Crusaders took Constantinople and founded the Latin Empire, but the Greek Empire was reestablished when it was regained by Michael Palæloguc in 1261. The Turks continued their advance, and in 1361 Adrianople was taken by the Sultan Amu-

BYZANTINE EMPIRE

rath. When Macedonia and Albania were conquered a little later, the Emperor John (1341-1391) became a vassal of Amurath and paid him tribute. At last Mohammed II attacked Constantinople in April, 1453, with 400,000 men. It fell in May of the same year. By 1461 all the possessions of the Byzantine Empire had been lost.

During the centuries following its separation from the Roman Empire the Byzantine Empire had stood as a bulwark, keeping the barbarians out until the other countries of Europe were able to protect themselves. It was also the treasure house of the culture of the past, and the scholars who sought refuge in western Europe after the fall of Constantinople were powerful factors in further quickening the general desire for knowledge which was already spreading through Europe.

C

CABBAGE, *Kab'aje,* a large-leaved plant of the Mustard Family whose closely-folded leaf buds, known as cabbage heads, are a familiar vegetable. The wild cabbage is a European plant with a stout stem and broad leaves, which show slight tendency to form a head, and differs greatly from the well-known garden varieties; these have been produced through cultivation, and the cabbage plant is one of the most apt to revert to its wild state. The most commonly raised cabbages are the Savoy, the Broccoli, the head cabbage and the cauliflower. They are eaten raw in salads, cooked or pickled in brine and allowed to ferment slightly, a form known as sauerkraut.

Cabbages do not head well in hot weather, hence good judgment is needed as to the time of planting. They are sown from seed, which is produced profusely, and mature in from 100 to 200 days. Cabbages are raised in small amounts all over the United States, but the production is extensive in the Southern States. Brussels sprouts are bud-bearing cabbages that originated in Belgium.

Cabbage Rose, or **Hundred-Leaved Rose,** a hardy shrub of the Rose Family, exceedingly popular for lawn decoration. It is a tall bush with slender stems that have straight, sharp prickles. The flowers are large, exceedingly double, and unfold in much the same manner and shape as cabbage buds. In color the flowers are generally a deep rose-purple or, rarely, pink or white. The petals, which are very fragrant and somewhat fleshy, are used in the production of rose-water, attar of roses and other perfumes.

Cabbage Worm, the larva, or caterpillar, of the cabbage butterfly, a member of the Pierid Family. There are three species, all of which are found commonly in gardens where they are especially partial to the tender leaves of cabbage and lettuce, but will attack vigorously any leaf. This larva is a green, fleshy caterpillar whose body is marked with yellow dots. It is commonest during the months when garden vegetables are growing, and is one of the caterpillars most frequently attacked by the ichneumon fly (See ICHNEUMON FLY). The pupa is a colorless sac, which may be seen clinging to the palings of fences or to walls.

The cabbage butterfly is of small size and is white, gray or creamy in color, frequently marked with dark spots. The antennæ are long and slender and have distinct knobs at their extremities. The cabbage worm is a common pest, whose presence is decidedly unwelcome. It may be exterminated by the use of common insecticides. See INSECTICIDE.

Cabinet, the collective body of ministers who direct the government of a country. In the United States the name is given to the heads of the administrative departments considered as a collective body. It consists of the secretary of state, the secretary of the treasury, the secretary of war, the attorney-general, the postmaster-general, the secretary of the navy, the secretary of the interior, the secretary of agriculture, the secretary of commerce and the secretary of labor. These officers act as an advisory board to the president and are appointed by him, but their appointments must be confirmed by the Senate. The United States cabinet members do not have seats in Congress, but there are two regular days of meeting each week, in the cabinet room of the White House. By the Presidential Succession Law of 1886, certain cabinet members are eligible to the presidency. See PRESIDENT.

In England, though the executive government is vested nominally in the Crown, it is practically composed of a body of

ministers called the cabinet. Every cabinet includes the first lord of the treasury, who is usually the prime minister; the lord chancellor; the lord president of the council; the chancellor of the exchequer; the first lord of the admiralty; and five secretaries of state. This cabinet has never been recognized by act of Parliament but is regarded as an essential part of the Government of Great Britain. The members of the British cabinet have seats in Parliament. The plan of the home government is also followed in the cabinets of Canada, Australia and South Africa.

Cable, *Ka' b'l,* **George Washington** (1844-), an American author, born in New Orleans, La. In 1863 he entered the Confederate army and served until the close of the Civil War. By 1879 his early literary ventures were a success, and, giving up his work as an accountant, he devoted all his time to writing. His novels are faithful portrayals of life in the South, and in his handling of the Creole dialect he has proved himself a master. He has written *Old Creole Days, The Grandissimes, Dr. Sevier, The Creoles of Louisiana, The Silent South, John March, Southerner, The Cavalier* and *Kincaid's Battery.*

Cable, Submarine, a cable laid on the ocean bed for the purpose of providing means of electrical communication. This kind of a cable is formed around a core, which is built up of one or more copper wires, insulated by gutta-percha. Around this, layers of jute are wound, and this, in turn, is sheathed in smaller cables, each consisting of several strands of steel wire. The entire cable is sheathed in a covering of jute, which is saturated with some bituminous compounds to make it waterproof. The size of the cable depends upon the strain it is to withstand, and is usually larger near the shore where the stress is greatest and where it is subject to wear and danger from being dragged by ships' anchors. The main portion of the cable which is to be on the deep-sea bottom is usually an inch or less in diameter. The receiving and dispatching apparatus works on the same principle as that of the telegraph, the making and unmaking of an electromagnet, but it is much more complicated and delicate than telegraph apparatus. See TELEGRAPH.

In 1870 Lord Kelvin perfected his siphon recorder, which is made by taking a very light coil of fine wire and suspending it between two poles of a powerful magnet. As the electric signals from the cable flow through the coil of wire, it swings round under the influence of the magnet, forward or backward, according as the current is positive or negative. These motions of the coil are transmitted by silk threads to a small glass siphon about the size of the needle and about three inches long, and suspended so that it swings freely. One end of the siphon dips into a vessel containing ink, and the other end hangs close above a moving strip of paper. The movement of the siphon is very feeble, so much so that if the siphon rested on the paper, it could not move, but when swung from right to left, it makes the ink splash on a paper ribbon in minute drops, forming a wavy line, a part of which is above and a part below a line drawn lengthwise the middle of the ribbon. The portions of the line on the upper half of the ribbon are read as dots, while those on the lower half are considered dashes. This device employs the Morse telegraphic alphabet code.

Other improvements have been made, so that now the speed of sending messages has been greatly increased, and messages can be sent both ways at the same time. Cable telegraphy is now so practical and comparatively inexpensive that every portion of the civilized globe is in cable communication with the rest of the world at all times. There are about 252,000 m. of submarine cables, enough to go around the world about 11 times, which cost about $200,000,000. Cables are a good investment, yielding a fair profit. The life of a cable is about 40 years, but they are attacked by all manner of fish, especially sharks, sawfishes and swordfishes. In the early days the tariff, or rate, was $100 per 20 words,

and $5.00 for each additional word. Rates now range from 25 cents a word across the Atlantic to about $5.00 a word from England to Peru. The average rate around the world is about $1.00 per word.

Atlantic Cable. This term was popularly applied to the first submarine cable connecting America with Europe. It was laid from Heart's Content, Newfoundland, to Valencia Bay, Ireland, a distance of 2000 m. Through the efforts of Cyrus W. Field and Peter Cooper of New York, the Atlantic Telegraph Company of New York was organized in 1854, and both American and English capitalists subscribed to its stock. Many engineering problems had to be solved in laying this cable, and it furnished the data and experience for subsequent cables. John W. MacKay and James Gordon Bennett of New York organized, in 1884, a cable system across the Atlantic from Torbay, N. S., to Valencia. Altogether there are nine live and active cables between North America and Europe, and they are, with the exception of the French lines, all consolidated under two managements, the Anglo-American Company and the Commercial Cable Company.

Pacific Cables. The Commercial Company has a cable nearly 7000 m. long, costing $12,000,000, laid from San Francisco via Honolulu, the Midway Islands and Guam, to Manila in the Philippines, and with an extension to Hongkong, China. In January, 1903, the first section from San Francisco to Honolulu, a distance of 2413 m., was completed. In laying this, depressions of over 5000 fathoms were found, making the undertaking extremely hazardous. The British Pacific cable extends from Vancouver, British Columbia, to Australia via Fanning Island, Fiji Islands and Norfolk Island, whence one branch extends to New Zealand and another to Brisbane, Australia. The entire length exceeds 8000 m.

Other Cables. The Eastern Telegraph Company of London is a huge financial organization controlling a network of cables, a number of them from Land's End in England through the Mediterranean to Suez, on through the Red Sea to Aden, across the Indian Ocean to Bombay, thence linking into this system Madras, Singapore, Hongkong, Manila, Australia and New Zealand. This Eastern Company also controls all the cables surrounding the coast of Africa, besides the cable reaching from England to Australia via the Cape of Good Hope, a distance of 15,000 m., or more than halfway around the world. The cost was $15,000,000. See Field, Cyrus West; Cooper, Peter.

Cabot, *Kab' ut,* **John** (about 1450-about 1498), an Italian navigator and explorer. Born in Genoa, he was naturalized in Venice and by 1495 was living in Bristol, England, where he held important offices. In 1496 he received permission from King Henry VII to sail into the Western seas, at the expense of certain English merchants, and to claim any lands which he might discover. The following May he left Bristol with one small vessel and 18 persons, returning to England early in August and being made lord-admiral, after having skirted Labrador. The next year, 1498, possibly accompanied by his son Sebastian, he sailed with a large expedition to the newly found land. There is no account of Cabot's second return nor is the extent of his discoveries known.

Cabot, Sebas'tian (1474-1557), an English navigator, son of John Cabot. Little is known of his early life. He may have accompanied his father's expedition of 1497. About 1517, in the employ of England, he is said to have visited Hudson Bay in search of a northwest passage to Asia. Subsequently he was made pilot major by Charles V of Spain, and sought a southwestern route to the Indies, exploring the La Plata River with scant success while on this trip. In 1548 he returned to England and was pensioned by Edward VI. Cabot was regarded as the greatest seaman of his day.

Cabral, *Kah brahl',* or **Cabrera, Pedro Alvarez** (1460-1526), a Portuguese navigator, principally famed for his voyage

of 1500-1501. On a passage to India, he attempted to follow the course of Vasco da Gama, around Africa; but he was accidentally driven too far westward, with the result that he touched Brazil. This he claimed for Portugal. He later reached India and concluded the first commercial treaty between his country and the Orient.

Cabul, *Kah' bool.* See KABUL.

Cacao, *Ka ka' o.* See COCOA, *Ko'ko.*

Cactus, *Kak' tus,* a name given to a number of Southern and Western plants of the Cactus Family, all of which, through climatic conditions, have acquired the form best suited to securing and retaining the greatest amount of moisture. The cacti are fleshy plants sometimes rather shrubby and fibrous, with jointed stems, and, in all but one species, with leaves which are reduced almost to spines. The flowers are generally large and showy but short-lived, and have numerous sepals and petals that grade imperceptibly into one another and surround the many long and threadlike stamens. The fruit, which stores a great deal of nourishment, is apt to be tough and fibrous but in many cases is edible. The efforts of Luther Burbank have been rewarded by the production of a cactus without prickles and whose stems contain plenty of nourishment for cattle. The prickly pear is a widely-known cactus since it grows farther north than most. It has a bright yellow flower and later a crimson, edible fruit called Indian fig. This cactus has been naturalized in Mediterranean regions and is there becoming a popular food product.

Other well-known cacti are the melon cactus, night-blooming cereus, spring cactus, giant cactus and nipple cactus. Many varieties may be found as house plants and in greenhouses in the North. The cactus is the national flower of Mexico, and the state flower of Arizona and New Mexico. See PRICKLY PEAR; CEREUS.

Caddice Fly, *Kad' is,* or **Caddis Fly,** a family of insects of the order Trichoptera, best known in their larval form. The eggs are laid in water, where they hatch into wormlike, aquatic creatures which build for themselves cases of pebbles, sand and splinters bound together by a silken thread. Some are cylindrical, some conelike and some twisted like the shell of a snail; the head and only three pairs of legs protrude from the case. There is an opening at each end, and the water is kept circulating through the case by the motion of the threadlike gills. The caddice worms may be free-swimming or may attach their cases to submerged rocks, sticks or bits of pondweed. In this stage they are used by fishermen as bait, but so tight is their hold upon the cases that they cannot easily be pulled from their retreats. When the larva is ready for its change to the pupal stage, it withdraws into the case, spins a silken web across the opening and remains inactive for several months. When it issues, it crawls up the stem of some neighboring weed to the surface, breaks its enveloping membrane, spreads its wings and flies away so suddenly that its flight is difficult to follow. In the adult stage little is known of it, except that it has four hairy wings, is nocturnal in habit and has a comparatively brief existence. See INSECTA.

Cade, John (?-1450), commonly known as Jack Cade, the leader of an English uprising which began in Kent in 1450. As the men marched toward London, Cade took command and for at least one day ruled the city. After the execution of the sheriff of Kent, Baron Say and Sele and others, Cade allowed his troops to take plunder and to release the prisoners of Southwark. Because of this and of a proclamation against him, many of his followers became disaffected and Cade fled to Sussex, where he was captured. He died on the way to London for trial.

Cadillac, *Kad' il lak,* **Mich.,** a city and the county seat of Wexford Co., 98 m. n.e. of Grand Rapids and about 85 m. n.w. of Bay City, on the Grand Rapids & Indiana, the Ann Arbor and other railroads. Cadillac is picturesquely situated on Little Clam Lake, in which there is good fishing, as well as in the trout

streams near by. Surrounding the town are vast tracts of hardwood timber, and the lumber interests are extensive. There are machine shops, chemical works, a charcoal iron furnace and wood-alcohol distilleries, also manufactories of hard wood, woodenware, veneer, flooring, crates, tables and flour. First settled in 1871, the town was incorporated in 1875 under the name of Clam Lake; two years later it was chartered as a city and its name changed to Cadillac in honor of the French army officer of that name. Population in 1920, U. S. Census, 9,750.

Cadmium, *Kad' mi um,* a rare metal, never found free in nature, and as a constituent, found chiefly in the uncommon mineral, greenockite. It is a silvery-white metal, rather soft at ordinary temperatures, uniting with oxygen sufficiently to tarnish the surface and so protect the rest from corrosion. Cadmium is used in preparation of cells for measuring electromotive force and as a pigment in water colors and oils; cadmium amalgam, an alloy of cadmium, is used as filling for teeth.

Cadmus, *Kad' mus,* in Greek mythology, son of Agenor, King of Phœnicia. His father commanded him to leave home in search of his sister, Europa, whom Jupiter had carried off. He was not to return without her. Wearied, at length, by long and unsuccessful wanderings, he consulted the oracle of Delphi. Here he was told to desist from his fruitless task and to follow a certain cow, which would lead him to the spot where he was to build a city. Cadmus found and followed the cow as instructed. Wishing then to sacrifice her to Minerva, he sent his men to draw fresh water from a near-by fountain. Here, however, they were all killed by a guarding serpent, which Cadmus then slew. Directed by heaven, he sowed the monster's teeth, which sprang up as armed soldiers. These contended among themselves till but five remained; but these survivors aided Cadmus in erecting the city of Thebes.

Harmonia, daughter of Venus, became the bride of Cadmus, all the gods attending their marriage. But sorrow followed the family, because of the slaying of the serpent, which had been sacred to Mars. At length, Thebes became so hateful that Cadmus and his wife went to the land of the Enchelians, where they were made rulers. "I'd like to be a serpent, since serpents are so dear to the gods," Cadmus sorrowfully remarked one day. Barely had the words passed his lips when his wish was fulfilled and he and Harmonia were changed to serpents.

Cædmon, *Kad' mun,* the earliest English Christian poet, writing in the last half of the seventh century. He is said to have been commanded in a dream to sing of "the beginning of created things." Against his will he obeyed, and when he awoke he remembered the verses, adding others to them. His gift of song was recognized as divine, and, gaining entrance to the monastery at Whitby, his days as a herdsman were over. He devoted his life to reproducing in verse the Scripture history, aiming to turn men away from sin and teach them the ways of righteousness. A copy of his first hymn is still extant in its original dialect.

Cæsar, Caius Julius (102-44 B. C.), the great Roman statesman and general. He was of noble birth but early allied himself to the democracy. In his 17th year he married Cornelia, the daughter of Cinna. When he refused to divorce her at the command of Sulla, his property was taken and he barely escaped with his life. He left Rome but returned on the death of Sulla. A little later, while traveling to study rhetoric under Molon at Rhodes, he was captured by pirates. After his ransom he returned and carried out his threat which he had jestingly made to them, and crucified them.

THE FIRST TRIUMVIRATE. When Pompey returned from his Eastern victories in 62 B. C., he found the Senate ready to criticize him and unwilling to grant his requests. Cæsar shrewdly allied himself with Pompey and Crassus in a coalition called the First Triumvirate. He was elected consul in 59 B. C. and soon obtained the favors that Pompey wished,

and he enriched Crassus and his friends. In 58 B. C. he became proconsul of Gaul for five years. When his term expired he was again reappointed for five years. The ties between Pompey and Cæsar were strengthened for a time by Pompey's marriage with Cæsar's daughter, Julia.

Conquest of Gaul. Cæsar won Gaul for the empire during these ten years by hard fighting and masterly diplomacy. The importance of this conquest can hardly be overestimated, as Gaul was early Romanized and for centuries served as an effective bulwark in preserving Roman civilization from the barbarians. For himself he gained wealth and an army trained in many battles and devoted to him, and these enabled him to take a leading part in Roman affairs.

Winning the Empire. Pompey grew jealous of Cæsar's success and of his growing popularity, and joined the Senate. Cæsar shrank from civil war. He wished to be consul again and to secure the needed reforms without violence. The Senate gave him no choice between personal ruin and open war, and in January, 49 B. C., he crossed the Rubicon, a little stream that divided his province from Italy. In 60 days with little bloodshed he had gained all Italy. He then defeated the lieutenants of Pompey in Spain in three months. Pompey had retreated to Greece and had gathered an army at Pharsalia in Thessaly, where he was overcome by Cæsar, 48 B. C. In four other campaigns Cæsar brought all the empire under his rule. He wasted a few months in Egypt, fascinated by the wiles of Cleopatra, but he quickly reduced Pharnaces, the son of Mithridates, crushed Cato and the senatorial party at Thapsus in Africa and overcame the sons of Pompey at Munda in Spain.

Cæsar cared little for military fame, but was more interested in the organization and administration of his empire. He began his constructive work by his mercy and kindness even during his wars. After Pharsalia he chose as his officers men of ability without considering upon which side they had fought. When he entered Italy the citizens expected a recurrence of the proscriptions that had disgraced the names of Sulla and Marius, but they were quickly won when they saw that he respected the rights of property.

Form of Government. Cæsar kept the old republican forms of government, but held the most important powers in his own hands. Thus he received the power of tribune, was made life censor and as Pontifex Maximus was at the head of the State religion. He was also made dictator for life, and the title of Imperator was conferred upon him and his descendants.

Reforms. With broad-minded statesmanship he grasped the idea of placing the provinces on equal terms with Italy and Rome; a bankrupt law released all debtors after they had given over their entire estates to their creditors; a commission to allot public land was appointed; and colonies were founded. By these and other means he greatly reduced the pauperized population in the capital. He again established Capua, Carthage and Corinth, cities which had been destroyed by Roman jealousy. Taxes were reduced and made equal. He took a census of Italy, reformed the calendar and the coinage, built the Julian Forum, began to codify the laws, established a public library and had in course of construction many other great public works.

Assassination. In the midst of these activities Cæsar was struck down by a jealous band of conspirators headed by Cassius and Brutus. We are told that they surrounded him, fawning upon him, as if to beg a favor. As they struck him he wounded Cassius, but, catching sight of his loved and trusted Brutus in the treacherous gang, he exclaimed sadly, "What! thou too, Brutus!" Then, resisting no longer, he drew his toga about him and fell at the foot of Pompey's statue.

Estimate of Cæsar. Cæsar is said to have been the one original Roman genius. His courtesy and charm were felt and dreaded even by his enemies. He had quick insight, was fertile in re-

sources, ready in forming decisions and possessed of a marvelous capacity for work. Compared with the men of his age, his breadth of view commands the admiration of all. That he was "ambitious" is true, but it was the ambition of a giant mind born with a love of order and heartily enjoying its self-imposed task of changing the empire almost ruined by anarchy and greed, into a compact, well-organized, well-administered state. Although his work was necessarily incomplete, he marked out the broad lines of change along which the country was to be successfully ruled for centuries. The people realized in the dissensions that followed his death, that, though they had destroyed the one man ruler, they had not escaped the rule. Peace and prosperity returned to the Romans only when, having passed through another period of anarchy, they came again under the rule of one man. That man was Octavius, the grandnephew of Julius Cæsar, and the Augustus of Roman History. See POMPEY.

Cæsarea Philippi, *Ses" a re' a Fil ip' i,* an ancient town of Palestine, earlier known as Paneas, north of the Sea of Galilee. The town now occupying the site of the ancient city is called Banias. It was situated on the most easterly source of the Jordan, on the great road to Damascus, and was especially attractive in the summer because of its groves of olives, plentiful supply of water and beautiful verdure. Herod the Great built here a beautiful marble temple, which he dedicated to his patron Augustus Cæsar. His son Philip added greatly to the size and grandeur of the town and renamed it Cæsarea. Hence the name Cæsarea Philippi. In Biblical history it is memorable as a place where Christ retreated for a period of rest and for the purpose of imparting instruction to his disciples.

Caffeine, *Kaf' fe in,* or **Theine,** *The' in,* the alkaloid which is found in coffee, tea and in small quantities in cocoa, and which gives them their stimulating effect. It is extracted by long-continued boiling and gives the characteristic bitter taste to coffee which has boiled too long. For this reason pouring boiling water over coffee or tea, thus producing an infusion, makes a milder and less stimulating drink. Caffeine is used medically as a stimulant.

Caiaphas, *Ka' ya fas,* a New Testament character. He was a Jew, and was the high priest before whom Christ was tried at the time of the crucifixion. In 35 A. D. he was deposed, being succeeded by Jonathan, son of Annas.

Cain, and Abel, *A'b'l,* the sons of Adam and Eve. Cain, the elder, becoming jealous of his brother, killed him. According to *Genesis iv, 15,* a sign was appointed for Cain, "lest any finding him should kill him." He then went into exile, and later built a city which he called Enoch, after his first son.

Caine, Thomas Henry Hall (1853-), an English novelist and dramatist, born in Runcorn. Abandoning architecture, for which profession he was qualified, he became a journalist, and in 1881 he came to London, where he lived with Rossetti until the latter's death. He published *Recollections of Rossetti,* which was followed by *Songs of Three Centuries* and *Cobwebs of Criticism.* As a prolific writer of melodramatic novels — the most successful of which deal with Manx life—he has published among others, *The Deemster, The Bondman, A Son of Hagar, The Manxman, The Christian* and *The Eternal City.*

Cairo, *Ki' ro,* the capital of Egypt, the largest city of Africa, situated near the right bank of the Nile, 150 m. s.e. of Alexandria. It is divided into separate quarters named after the nationality of the inhabitants. It covers an area of 11 sq. m., and is surrounded by a low, fortified wall. In the old Arabian quarters are crooked, narrow, unpaved streets, lined with stone houses several stories high, having window lattices of wrought iron; the western part, or Ismailieh, presents a modern appearance with its electric tramways, broad, gas-lighted avenues, imposing buildings and beautiful squares. Among the structures of the city the numerous mosques of Arabic ar-

chitecture are the most striking, the finest one being the Gami-ibn-Tulun, erected about 879, and the oldest, the Gami-Amra. Other buildings are the palace of Gesireh and of Addin, the vice-regal residence, the mosque in which is situated the El-Azhar, considered the oldest university in the world, various technical, missionary and Arab schools and the vice-regal library. The bazaars and curious shops are interesting spectacles, and the picturesque venders of fruit with their quaint cries add to the attractiveness of the street scenes. Bedouins from the desert make use of these bazaars; other nationalities represented are Arabs, Nubians, Italians, Greeks, French, British and Jews.

Until 1877 there was a general traffic in slaves. Paper, cotton, textiles, sugar, silk goods, saltpeter, leather and gunpowder are manufactured. There is a large transit of native and European goods, which is facilitated by good railway communication with Alexandria, Suez and Upper Egypt. Amr, the conqueror of Egypt, founded Old Cairo in 640; the new city of El-Kahira, corrupted into Cairo, was established by Jauhar el-Kaid, in 968. The Crusaders unsuccessfully attacked it in 1176. The Turks conquered it in 1517, and it was captured by the French in 1798 but returned to the Turks in 1801. Through them it came to Mehemet Ali, the founder of the present dynasty. British troops have garrisoned the city since 1882. Population in 1919, including Helwan and Mataria, about 750,000.

Cairo, *Ka' ro,* **Ill.,** a city and the county seat of Alexander Co., 365 m. s. of Chicago in the extreme southern part of the state at the confluence of the Ohio and Mississippi rivers, and on the Illinois Central, the Big Four, the Mobile & Ohio, the St. Louis, Iron Mountain & Southern, the St. Louis Southwestern and other railroads. A fine railway bridge two miles long spans the Ohio at this point. The city is built on a tongue of land between the two rivers and is an important port of entry, having an extensive river trade. It is the market for the agricultural products of the surrounding country. The chief manufactures are flour and lumber. The hardwood and cottonwood industries are considerable and there are box and veneer factories in the town.

Among the notable features of the city are a government custom-house, a United States marine hospital, the A. B. Stafford Memorial Library, St. Joseph's Loretto Academy (Roman Catholic), St. Mary's Park and a public square containing a bronze statue (*The Hewer*), by G. G. Barnard. At Mound City, five miles above Cairo, there is a national cemetery. Until the building of levees, begun in 1857, Cairo suffered from frequent and destructive inundations. During the Civil War the place was an important strategic point and depot of supplies for the Federal Government. Cairo is said to be the "Eden" of Charles Dickens' *Martin Chuzzlewit.* The first permanent settlement on the site of Cairo was made in 1851. The place was chartered as a city in 1857. Population in 1920, U. S. Census, 15,203.

Caisson, *Ka' son,* a water-tight chest or casing used in building bridge piers and other structures in water too deep to employ a cofferdam. The caisson is sunk, and its size provides for the entire structure to be built inside of it. A pneumatic caisson has an air chamber into which air is forced in order to keep out the water. Men work in these caissons and enter by means of an air lock. The term *caisson* is applied also to the boat-shaped gate used to close the entrance to a dry dock. In military practice it is used to designate that part of a battery of artillery which carries the ammunition chests and supplies.

Calabar, *Kal"a bahr',* **Bean,** the seed of a climbing plant of the Pulse, or Pea, Family, grown in tropical Africa. The plant resembles our bean, having thin, pointed leaves set in threes on the leaf-stalks, and pods of dark-colored seeds. The seeds are poisonous but are the source of a medicine efficacious in cases of rheumatism, neuralgia and blood poisoning, and used by oculists to contract

the pupil of the eye. The natives of Africa make use of the poison of this seed in their trials for witchcraft.

Calabash, *Kal' a bash,* **Tree,** a small evergreen tree of the Bignonia Family, inhabiting the West Indies and tropical America. The trunk is smooth, with regularly spreading branches and broad, tapering leaves. The flowers, which grow in clusters upon the older limbs, are large and white in color. The tree has received its name, which is the same as the technical name for the gourd, because its fruits are yellowish in color and have hard rinds as do the gourds. Like them, too, they are used in making dippers, bottles, cups and other dishes. The baobab tree of the Mallow Family is also called calabash. See BAOBAB.

Calais, *Ka la',* a seaport town in France, in the Department of Pas-de-Calais, 25 m. s.e. of Dover. The old town contains a citadel and was formerly surrounded by fortifications; among the prominent buildings are the Church of Notre Dame, the old Hôtel de Ville and the Hôtel de Guise. The manufactures of the town have increased in importance within recent years and include the making of hats, gloves, hosiery, bobbinet and machine-made lace; distilleries, salt refineries and shipyards are also found. Calais was a small fishing village in the ninth century; from 1347 to 1558 it was in the hands of the English, since which time it has remained almost uninterruptedly in the possession of the French. Population, about 59,000.

Calamander, *Kal"a man' der,* **Wood,** a wood produced from a tree of the Ebony Family. The tree is native in the East Indies and the wood is there much used for furniture, inlaying and cabinetwork. Unlike most ebonies, which are black, the calamander is a soft brown color and has darker brown or black stripes. The natives of India make great use of all the ebonies, but calamander is less widely exported than those which are wholly black.

Calceolaria, *Kal"se o la' ri a,* a shrub of the Figwort Family, imported from South America for greenhouses or gardens. The flowers are very irregular in shape and have so many variations that a description of each variety would be necessary in order to distinguish them. The leaves are rounding and hairy and spring mostly from the root.

Calcium, *Kal' si um,* a metal widely distributed in combination with other elements, but never found free. It is familiarly known as a carbonate in chalk, limestone and marble; as a sulphate in gypsum; as a phosphate in the bones and teeth of animals; as a silicate in clays; and, in various combinations, in all spring waters.

Calcium is a tin-white metal, tough and somewhat soft at ordinary temperatures. Pure calcium decomposes water and hence should be kept under petroleum or in air-tight jars. At high temperatures it burns with a brilliant white light.

In combination with other elements calcium is extremely useful. Its carbonate is used in the manufacture of building stone and cement and in the reduction of iron ores; its silicate, in the manufacture of glass; and its oxide, in the manufacture of putty. Alabaster, a crystalline form of calcium sulphate, is used in plaster of Paris, surgical bandages, fertilizers and casts. Calcium sulphide, which is luminous after being exposed to light, is used for faces of clocks. Calcium hypochlorite, or bleaching powder, used in whitening paper, calico and linen, is a by-product of soda manufacture. Calcium phosphate is a good fertilizer, providing plants and animals with the necessary phosphorus. See GLASS; CEMENTS; LIME.

Cal'cula"ting Machines, machines of different types for making various arithmetical calculations. In their simplest form they merely add. The street-car fare register and the cash register are examples of this type. These are operated by levers or keys which rotate wheels, on whose faces numbers from 0 to 9 are marked. By arranging the first wheel in the series to contain the units, the next the tens, the next the hundreds and the next the thousands and so on, additions are shown as the wheels are

severally rotated. In making a complete revolution from 0, the first or unit wheel takes up the second (or tens) wheel one step. When it reaches the point 0, the second wheel is moved to make 1, and 10 is indicated. When the second is rotated once to mark 0, it would mean 100 for the first wheel. Machines provided with keyboards, similar to typewriters, are made to do not only adding but subtracting, multiplying and dividing. Some of the more complicated machines also can be made to extract the square root and cube root of numbers. Machines driven by electric motors and capable of performing a large number of the calculations necessary in banks, offices, etc., are extensively used.

Calculus, *Kal' ku lus,* a method of scientific computation which is applied in many regions of investigation but is commonly taught as the highest branch of pure mathematics. As commonly used, the term refers particularly to infinitesimal, or differential and integral, calculus, and deals with the properties of variable quantities. The rate of change of a variable is known as the *differential,* and the process of finding this differential when the variable is known is called differential calculus; the reverse of this, or finding the variable when its rate of change is known, is called integral calculus. Applications of the principles and formulas so developed are made in many departments of applied mathematics, as, in astronomy and in many mechanical problems.

The invention of calculus was announced almost simultaneously by Leibnitz in Germany and by Sir Isaac Newton in England near the close of the 17th century, but the system of notation devised by Leibnitz is that universally used at present. Modern researches have merely widened the field of usefulness and broadened the application of the principles of the subject. In its broadest sense, the term *calculus* is used to refer to all mathematical computations except those of geometry.

Calcutta, *Kal kut' a,* the former capital of British India and the present capital of the Province of Bengal, situated on the left bank of the Hugli River, about 80 m. from the sea. The suburbs are extensive, and the large town of Howrah is connected with Calcutta by a pontoon bridge. There are several beautiful gardens and drives, including the Botanical Gardens, the Maidan, or park, which includes Ft. William, the race course and the Red Road, where the élite of Calcutta take their evening drive. The Chowringhee, facing the Maidan, is one of the famous streets of the world.

Among the prominent buildings are the large fortress, Ft. William, the Government House, the arsenal, the long row of buildings lining the Strand, among which are the custom-house, the new mint and other government offices; there are also Hindu temples, mosques, churches, pagodas, the court of justice, the Writers' Building, the town hall, the Bank of Bengal, the Jesuit College, the university, museums and theaters. Because of the great number of its fine buildings Calcutta is frequently called the "City of Palaces." The many educational institutions make ample provisions for liberal, technical and religious instruction. Steamship, railway and telegraph lines maintain direct communication with the principal towns of India and with important European, especially British, ports. The city is the center for about one-third of the Indian trade. The industries are shipbuilding and the manufacture of sugar; cotton, rice, wheat, opium, jute, gunny bags, coffee, hides, tea, indigo, seeds and raw silk are exported.

Calcutta was founded by Job Charnock of the English East India Company in 1690. The original Ft. William was built in 1696 and the three villages of Sutanati, Kalikata and Govindpur were purchased two years later. In 1756 the ruler of Bengal, Surajah Dowlah, captured the city after a two days' siege, and his prisoners were thrown at night into the notorious "Black Hole," only a few surviving the terrible sufferings. After eight months Clive, assisted by Watson, recaptured it, and peace was

concluded. In 1902 Lord Curzon erected a monument to commemorate this event; a black marble slab now covers the site of the Hole. Calcutta was made the capital of Bengal in 1772 and was the seat of government for India until the coronation of George V at Delhi in 1911, when that city was made the capital. Population, 1,122,313. See DURBAR.

Calderon de la Barca, *Kal"da ron' da lah Bahr'ka,* **Pedro** (1600-1681), a Spanish dramatic poet, born in Madrid. Next to Lope de Vega, he has rank as Spain's greatest dramatist, and, though his plays lack the universality and humanity of Shakespeare's, they possess the finest characteristics that belong to the golden period of literature during which they were written. He wrote religious plays, of which almost 80 are extant, and his other dramas include *The Constant Prince, The Physician of His Own Honor* and *Such Stuff as Dreams Are Made Of.*

Caledonian, *Kal"e do' ni an,* **Canal,** a waterway 60 m. long, 23 m. of which consist of artificial channels, with 28 locks. This canal, opened in 1823, passes through the Great Glen of Scotland, and is used by vessels of 500 or 600 tons in going from the North Sea to the Atlantic, which thus effect an average saving (for sailing vessels) of about ten days. It is a favorite route for tourists, as the scenery is perhaps the finest in Scotland.

Cal'endar, the name applied to the adjustments of time divisions by which the civil year is made to correspond with the solar year. The name comes from the *calends* of the Latins. This was the first division of their month and took the name from the Latin *calo,* to call together, because the priests called the people together on the first of the month to announce to them the festivals for the ensuing month. The lunar months, however, did not correspond to the solar year with sufficient accuracy to avoid confusion. Julius Cæsar made a more accurate adjustment by making three successive years to consist of 365 days each and the fourth year, 366 days (See LEAP YEAR). This is the Julian Calendar. The exact solar year, however, consists of 365 d., 5 h., 48 min., 47.8 s., which is 11 min. and 12.2 s. shorter than 365 plus one day in four years, or one-fourth day yearly. In the course of 400 years this difference would throw the calendar about three days behind the sun.

In 325 at the Council of Nice the matter of this discrepancy, which at that time amounted to ten days, was taken up by the Catholic Church, and the result of their deliberations was the Gregorian Calendar, now almost universally adopted by the civilized world. This calendar provided for the extra time not provided for in the Julian Calendar, first by calling the day after the 4th of October, 1582, not the 5th but the 15th of October, so rectifying the error. It then provided for future accuracy by dropping the extra (intercalary) day from one leap year of every century whose number cannot be divided evenly by 400; as 1700, 1800, 1900; but retaining it in 2000. The error in the present calendar amounts to less than one day in 3000 years. See YEAR; ALMANAC; DOMINICAL LETTER; SIDEREAL TIME.

Calgary, *Kal' ga ry,* a city of Canada, the most important in the Province of Alberta, situated at the confluence of the Bow and Elbow rivers and on the Canadian Pacific and Grand Trunk Pacific railways, 640 m. w. of Winnipeg and 420 m. e. of Vancouver. It is the center of a rich agricultural region devoted to stock raising and grain growing and is the distributing center between Winnipeg and the Pacific coast. Most of the buildings are constructed of light gray stone, and include three hospitals, a sanitarium, opera house, railway shops, municipal buildings, Western Canadian College, Mt. Royal College and University of Calgary. More than 60 Eastern manufactories are established here with branch departments or agencies. The industrial establishments include iron, cement, brewing and leather works, cereal, biscuit and soap factories and flour mills. Large shipments of cattle, sheep, horses and wheat are made annually. Extensive

work is being done two miles from Calgary by the Canadian Pacific Railroad, to divert the waters of the Bow River, which flows from a pass in the Rocky Mountains, into an arid piece of country for irrigation purposes. The main and secondary canals extend 250 m. and the distributing ditches 500 m., thus watering 3,000,000 acres of fine wheat-growing lands. The Canadian National Park and the summer resort of Banff are 81 m. west of the city. Calgary was founded in 1874 and incorporated in 1885. Population 60,000.

Calhoun', John Caldwell (1782-1850), a distinguished American statesman, born in South Carolina of Scotch-Irish parentage. In spite of early poverty he succeeded in entering Yale College, where he graduated in 1804. He was admitted to the bar in 1807. He served for a short time in the State Legislature and was elected to Congress in 1811, where his ability, integrity and training soon marked him as a statesman and leader of the first rank.

Calhoun served as secretary of war under President Monroe during both of his administrations, 1817-1825, and his influence in this department was felt for more than a generation. In 1824 he was elected vice-president of the United States, with John Quincy Adams as president. In this office he found leisure for further study, and his views gradually changed to the advocacy of free trade with a tariff for revenue only, and of the supreme authority of the sovereign states. He was again elected vice-president in 1828, as a radical Democrat, with Andrew Jackson as president.

It was during this period that Calhoun formulated his famous "nullification" doctrine; that a state was not bound by a law of the United States if it believed that law to be unconstitutional. He led the fight in South Carolina for the nullification of the tariff law of 1828, culminating in the Nullification Act passed by that state in 1832. This caused a break with President Jackson, who, by a prompt and determined use of Federal authority, crushed the nullification movement. Calhoun resigned the vice-presidency and reentered the Senate in 1832, where he served until 1843. He was there an ardent advocate of states' rights, and, incidentally, of slavery.

In 1844 Calhoun became secretary of state under President Tyler and in this capacity he concluded the annexation treaty with Texas. He again entered the Senate in 1845 and resumed his leadership of the Southern cause. He established a reputation as a great debater, Calhoun, Webster and Clay being often called the "Great Trio." Calhoun was exceedingly attractive in personality and character and possessed qualities of statesmanship that have rarely been equaled in the history of the United States. During the last few years of his life he published the *Disquisition on our Government* and the *Discourse on the Constitution and Government of the United States.*

Calico, *Kal' i ko,* a name originally given to a white cotton cloth received from Calicut, India, but now used to include a large number of printed and colored cotton cloths, which are coarser than muslins and generally sold in the United States as prints. The art of printing colored patterns upon cloth is not, however, limited to cotton goods, but is applied also to woolen, worsted, silk and linen fabrics, and was known in the first century in Egypt and India, but it was not introduced into Europe until the 17th century.

CALICO PRINTING. Printing on cloth was originally done by means of wooden blocks, and the process was similar to that of printing wall paper (See PAPER HANGINGS). The modern press for printing calico bears a strong resemblance to the press used for printing newspapers. The essential parts are a large cylinder, small cylinders of copper, upon which the pattern is engraved and arranged around the large cylinders, and the apparatus for distributing the coloring matter. In printing, the cloth passes over the large cylinder and under the smaller cylinders, which impress the pattern upon it.

There are three methods in calico printing, known as *direct printing, combined printing and dyeing,* and *discharge and reserve* methods. In the first the design is printed directly on the cloth in the colors desired. This was the original method of printing, but it now is little used because of the difficulty of getting dyes that will not fade. The combined method is one employing mordants (See MORDANTS; DYEING), and in it there are many variations. It depends upon the principle that the same dye, when treated with different mordants, will produce different colors, so that ink containing a mordant is used in printing the patterns, and the goods are afterwards dipped in a suitable dye, which upon exposure to heat and air brings out the desired colors. This method produces what are known as fast colors, that is, colors which will not fade. The discharge and reserve method of printing is such that when the process is completed, portions of the cloth are white. This is accomplished either by stamping upon the cloth some substance, like clay or wax, that the color will not penetrate, or by stamping a substance on the cloth that will, when moistened, dissolve the color and produce the desired pattern.

Cal"ifor'nia, THE GOLDEN STATE, one of the Pacific States, is bounded on the n. by Oregon, on the e. by Nevada and Arizona, on the s. by Mexico and on the w. by the Pacific Ocean.

SIZE. The length from north to south through the middle is 750 m., the average breadth is 200 m. and the area is 158,297 sq. m., of which 2645 sq. m. are water. The length of the coast line is 1200 m. If placed along the Atlantic seaboard, California would extend from Charleston, S. C., to Boston, and inland as far as South Carolina. California could contain all the New England States, New York and Ohio and then have room to spare. It is almost four times the size of Ohio and is the second state in area.

POPULATION. In 1920 the population was 3,426,861. From 1910 to 1920 there was a gain in population of 1,049,312, or 44.1 per cent. There are 22 inhabitants to the square mile and the state's rank in population is 8.

SURFACE. The Coast Range, which comprises a number of short ranges, extends along the coast from a point on the northern boundary to Pt. Conception. The Sierra Nevada Mountains extend along the eastern border, being from 50 to 100 m. west of the boundary, for 450 m., when they trend westward, forming the Tehachapi Mountains, which join the Coast Range. At the north the Sierra Nevadas also send out spurs to the westward, making the northern part of the state a mountainous and broken region. One of these ranges culminates in Mt. Shasta, one of the most celebrated mountains in the United States. Between the Sierra Nevadas and Coast Range is a great central plain entirely enclosed by mountains and having an area of 18,000 sq. m. The surface is nearly level, but is divided into two valleys which slope toward the center. The northern is drained by the Sacramento and the southern by the San Joaquin River. This plain is one of the most valuable agricultural regions in the world. The Sierra Nevada Mountains rise from north to south and culminate in Mt. Whitney, the highest mountain in the United States. They also contain a number of other peaks over 14,000 ft. in altitude (See SIERRA NEVADA MOUNTAINS).

The region south of the Tehachapi Mountains, known as Southern California, is less mountainous than the Sierra Nevada region, but has a general rolling and uneven surface. The San Bernardino Mountains extend from the Colorado River northwest to a point a few miles north of Los Angeles. Mt. Lowe, near the northern edge of the range, is visited by many tourists. To the southeast of Mt. Whitney lies Death Valley, 280 ft. below the level of the sea, and at the foot of the western slope of the San Bernardino Mountains is the bed of an ancient salt lake, which is 275 ft. below the sea level. A lake in this depression is known as Salton Sea. Between the San Bernardino and Tehachapi mountains and occupying portions of Los

Angeles, San Bernardino and Kern counties is the Mohave Desert. Among the foothills and mountain ranges of Southern California are numerous valleys which, with the lowlands, are extremely fertile when supplied with water.

Rivers and Lakes. The great central plain is drained by the San Joaquin and the Sacramento rivers, which unite before entering San Francisco Bay. The Pitt, a branch of the Sacramento, rising in Goose Lake, in the northeastern part of the state, drains that section, and the Klamath, rising in Klamath Lakes in Oregon, drains the northwestern corner. The remainder of the northwestern portion is drained by the Eel, Mad, Trinity and Russian rivers. All of these streams flow directly into the Pacific. The Salinas drains that portion of the coast region between Monterey and Pt. Conception.

There are many mountain lakes, most of them below an altitude of 8000 ft. and all noted for their beauty. Honey, Clear, Tulare, Tahoe, Mono, Owen's and Eagle are among the most widely known of these lakes.

Scenery. The scenery of California in its variety, beauty and grandeur is not surpassed by that of any state or country in the world. The Sierra Nevadas furnish all that can be desired in wildness and grandeur. They have 41 peaks exceeding 10,000 ft. and 11 exceeding 13,000 ft. in altitude. From the summit of Mt. Whitney one can look down into Death Valley, one of the most remarkable depressions in the world. Among these mountains are numerous cascades and waterfalls, deep valleys, canyons and gorges formed by the streams. Of all these, Yosemite Valley is the most noted. There are several others equally inspiring, and when accessible will be equally attractive (See Yosemite Valley). The big trees in Mariposa and Calaveras groves are peculiar to California. They represent the oldest living vegetation in the world. Some of them are 375 ft. high and 38 ft. in diameter, and are estimated to be more than 5000 years old (See Sequoia). Lake Tahoe, partly in Nevada and partly in California, is widely known for its beauty, and other mountain lakes are also of more than local interest. Golden Gate, which breaks the barrier of the Coast Range to form an entrance into San Francisco Bay, is one of the most beautiful inlets. In order that these scenic features may be preserved to the people the National Government has enclosed some of the most interesting in national parks, such as Yosemite National Park and Sequoia National Park.

Climate. California is said to have all the different sorts of climate in North America, ranging from the semitropical in the lowlands of Southern California to the Arctic on the summits of the mountains. The barrier of the Sierra Nevada Mountains shelters the state from the cold winds of the north and the winds from the Pacific exert an equalizing influence on the temperature of the lower levels. For these reasons changes in temperature are due more to differences in altitude than to differences in latitude. In the great valley in the interior the temperature may rise to 100°or more in July and August, but this extreme is only occasional and of short duration. Here the summers for the most part are pleasant and even delightful. Along the coast there is a difference of only four degrees between the mean temperature of the summer and that of the winter months, and the temperature of Southern California is practically the same throughout the year. In the high altitudes of the Sierra Nevadas the winters are cold and the snowfall is heavy.

The year is divided into the rainy season (winter) and the dry season (summer). In the northern part of the state, along the coast as far south as San Francisco there is sufficient rainfall for agriculture, but in the southern and central parts irrigation is necessary. California is a "winterless land." Stock can roam without shelter throughout the year and there is scarcely a day in which outdoor work cannot be done.

Minerals and Mining. The mineral resources of California are extensive and

varied. The state produces more than 40 mineral substances that are of commercial value. In order of value the most important of these are gold, petroleum, copper, borax and its products, clays, quicksilver, silver, lead and salt. The oil fields in the southern and central parts are among the most valuable in the United States and their combined output in 1911 was about 83,000,000 barrels. The output of gold is about $20,000,000 in value. Gold mining is most extensive in the mountainous counties north of Tuolumne. The principal copper mines are in Shasta County. The great borax mines are in San Bernardino County. More than nine-tenths of the borax produced in the United States comes from Death Valley. The chief quicksilver mines are north and south of San Francisco Bay. Precious stones including tourmaline, beryl, topaz and chrysoprase are found in various localities among the mountains.

Forests and Lumber. California is the second state in the amount of standing lumber, being exceeded only by Oregon. The forest areas of the state are in the mountainous section north of Southern California and have an extent of over 44,000 sq. m. Large forest reservations have been established by the United States Government and by the state. In the forests are found the big trees and the giant redwoods which often reach a diameter of 18 ft. Both of these trees are peculiar to California. The redwood is of great value for interior finishings. The Douglas spruce, incense cedar, sugar pine and silver fir all attain great size, often reaching 200 ft. in height and 6 ft. in diameter. Maples, birches, aspens sycamores and other varieties are also found in the forest areas. Lumbering is one of the important industries and the yearly output amounts to about $25,000,000.

Agriculture. Agriculture is the most widely extended and important industry of the state. The great variety of soil and climate lead to a great variety of products, ranging from those of the cool temperate regions to those of semitropical latitudes. In the valleys of the Sacramento and San Joaquin rivers diversified farming is generally practiced. The chief field crops are alfalfa, wheat, barley, corn, oats and rye. Garden vegetables are raised in large quantities for the home markets and for canning, and sugar beets are an important crop. In these valleys, as in Southern California, all kinds of fruits are raised, and fruit growing is the dominant industry. Large orchards and vineyards cover the floor of the valleys and orange groves are frequent in the foothills as far north as Mt. Shasta. The largest almond orchards of the state are found in Yolo and adjoining counties.

Raising horses, cattle, sheep and hogs is an important branch of agriculture in the northern and central parts of the state. Over 2,000,000 sheep are kept in California and the annual wool clip averages about 14,000,000 lb. Throughout the state there is a great demand for poultry and eggs, and bees are profitable. Dairying is also of great importance and over 50,000,000 lb. of butter and 5,000,000 lb. of cheese are made yearly. The annual value of the dairy products exceeds $29,000,000.

The great industry of Southern California is fruit growing. Practically all of the area under cultivation is irrigated land. California leads all other states in the production of oranges, lemons, grapefruit, grapes, prunes, plums and cherries. Fresno County is the center for growing grapes for raisins. The yearly crop yield is from 60,000 to 70,000 tons of raisins. In this and other counties grapes are also raised in large quantities, some for table use, but by far the larger quantity for making wine. The orange crop in 1911 was 46,394 carloads. Walnuts are also successfully grown in this and other parts of the state.

Irrigation is essential in the southern and central parts and it is very helpful in many other localities. The great irrigation projects are in northern California in the Sacramento Valley. Several million acres of barren land have already been reclaimed and made fruitful, and

thousands of acres of other land have had their fruitfulness increased by irrigation, while the work is being extended every year. California leads all other states in amount of irrigated land.

FISHERIES. The whale fisheries of the Pacific Ocean have their headquarters in San Francisco. Canning salmon and other fish is an important industry, and from the coast waters salmon, sturgeon, tomcod, halibut, mackerel and Spanish mackerel are taken in large numbers. Crabs, bass and shrimps are also abundant and furnish the supply for the home markets. The inland lakes and streams abound in fresh-water fish, and Rocky Mountain trout here grow to a large size. Other varieties of trout, black bass, shad and carp have been introduced into the lakes and streams by the fish commission.

MANUFACTURES. Many mountain streams furnish water for generating electric power which can be transmitted long distances. The abundance of petroleum for fuel is also encouraging to the development of manufacturing industries, and San Francisco has one of the largest shipbuilding yards in the country. The iron and steel products of this city are also important. The manufacture of lumber and lumber products is one of the leading industries. Next to these in importance is the making of wine. Among the minor industries are slaughtering and meat packing, canning and drying fruit, refining sugar, the manufacture of clothing, boots and shoes, cordage, flour and cereal products and the making of machinery and leather. San Francisco, Los Angeles, Oakland, Stockton and Sacramento are the most important manufacturing centers.

TRANSPORTATION AND COMMERCE. There are over 10,000 m. of railway and over 1700 m. of electric lines within the state. The Southern Pacific system has a number of lines extending north and south the entire length of the state. The Santa Fe enters the state from Arizona and extends in a northwest direction to San Francisco. It also has a branch running from Los Angeles to San Diego. Other lines of importance are the Carson & Colorado, the Tonopah & Tidewater, the Northwest Pacific, the San Pedro, Los Angeles & Salt Lake and the Western Pacific. Oakland, opposite San Francisco, is the great railway center and all trunk lines meet here. Los Angeles, Fresno and Sacramento are other important centers.

The chief electric systems are about San Francisco, Los Angeles and Oakland. The Los Angeles system is the most extensive in the world and connects that city with all the cities and towns within the radius of 50 m.

California's commerce is extensive. The interchange of products between different parts of the state and supplying the local markets in San Francisco, Los Angeles and Sacramento and other cities make a trade of no mean proportions, but the largest part of the commerce is with other states and countries. Products peculiar to the state are sent to other parts of the United States and dried and canned fruits and wines are in demand in foreign lands. San Francisco is the largest and most important seaport on the Pacific Coast of the American continent. San Francisco Bay is one of the best harbors in the world. This port is the central meeting point for ships from the Orient and transcontinental lines of railway. Consequently San Francisco has a large foreign trade amounting to over $100,000,000 a year. Imports consist chiefly of manufactures and the products of China, Japan, India and the Philippine Islands.

GOVERNMENT. The first constitution was framed in 1849. The present one went into effect in 1880, but has been several times amended, the last time in 1911, when women received the franchise. The constitution requires an educational test for voting and contains detailed restrictions on legislative action. The executive department consists of a governor, lieutenant-governor, secretary of state, attorney-general, treasurer, controller, surveyor-general and Supt. of public instruction. The Legislature consists of a Senate of 40 members and an Assembly of 80 members. Senators are elected for

four years and assemblymen for two years. The sessions are biennial and practically limited to 60 days.

The judicial department consists of a Supreme Court of six judges and a chief justice, elected for 12 years; and District Courts, Courts of Appeal, Superior Courts and justice courts. Agreement of three-fourths of the jury is sufficient for decision in civil cases. A jury may be waived in minor criminal cases.

EDUCATION. California has one of the best public school systems in the Union. The educational system is in charge of a state board of education composed of seven members appointed by the governor and the superintendent of public instruction who is elected by the people. The superintendent of public instruction is the executive officer of the board. The schools of each county are under the supervision of a county superintendent. Requirements for a teacher's certificate are higher than in most of the states. The rural schools have a uniform course of study and rank very high. There are three classes of high schools in the state; city high schools, county high schools and union district high schools, which are established by adjoining districts uniting for this purpose. These schools are of great importance because they enable the pupils of rural schools to obtain a high school education while remaining at home. The University of California at Berkeley is at the head of the educational system. Eight State normal schools are maintained at Arcata, Fresno, Chico, Los Angeles, San Diego, San Francisco, Santa Barbara and San Jose. The state polytechnic school is at San Luis Obispo. There are a number of higher institutions of learning not under control of the state, the most important of which is Leland Stanford Junior University at Palo Alto (See LELAND STANFORD JUNIOR UNIVERSITY).

STATE INSTITUTIONS. The hospitals for the insane are at Agnew, Napa, Stockton, Patton and Ukiah. The schools for the deaf and blind are at Berkeley and the home for the feeble-minded is at Glen Ellen. The state prisons are at Folsom and San Quentin, the state reform school is at Whittier and the Preston School of Industry at Ione, Amador Co.

HISTORY. California was named by its early Spanish discoverers from the fictitious island, supposedly in the Far East near the Equator, which played an important part in Montalvo's "La Sergas d' Esplandian." In 1534 the Spanish, while conducting explorations from their base in Mexico what they then and for a century afterward thought to be an island, but which was really the peninsula of Lower California.

In 1542 Cabrillo sailed up the coast, discovered San Diego and Monterey Bays, and turned back just before reaching the vicinity of San Francisco. Other voyages were undertaken by the Spanish during the remainder of this century and the next, with a view to finding a stopping place for the Manilla Galleons, but no settlements were made.

In the 18th century the Russian advance from the North, and the activities of the English made the occupation of Alta or Upper California imperative to the Spanish if they were to hold it. An expedition was organized by Don Gaspar de Portola, the first Governor of all California. A band of Franciscan missionaries, led by Father Junipero Serra, accompanied the expedition, some of the party remained at San Diego, the remainder set off up the coast, and discovered the great harbor of San Francisco.

The settlements all flourished, especially after the Mexican Revolution. By 1846 the Americans were coming into California, and a revolution led by Captain Fremont led to the proclaiming of the Bear Flag Republic at Sonoma. By the treaty of Guadalupe Hidalgo, however, California was given to the United States. On January 24, 1848, a piece of native gold was discovered at Coloma, with the result that during 1849 over 100,000 men flocked into the state. (See GOLD.) California enjoys the distinction of being the only state added to the Union without going through the pre-

liminary organization of a territory. A constitution was quickly adopted, and in 1850 California was admitted as a free state. Since the Civil War, its development has been marvelous.

California, University of, at Berkeley (1868). This institution was opened temporarily at Oakland in 1869, after taking over the College of California, chartered in 1860. In 1873 it was transferred to its permanent home at Berkeley. In 1899 a prize of $10,000 was awarded to M. Emile Bénard of Paris, the winner in an international contest arranged by Mrs. Phœbe A. Hearst for a worthy general plan for the Berkeley campus. In harmony with this plan its many magnificent buildings, including a Greek theatre, have been erected. The university maintains forty-five departments at Berkeley, five professional colleges in San Francisco, the famous Lick Observatory at Mt. Hamilton, and an experimental farm of 800 acres at Davis, the Kearney Ranch consisting of approximately 5,200 acres of fertile vineyard and alfalfa land, the Citrus Experiment Station and Graduate School of Tropical Agriculture at Riverside, consisting of 475 acres, and the Scripps Institution for Biological Research at La Jolla. The faculty numbers 600. The total number of students, exclusive of those in Extension courses, the short courses in Agriculture, the University Farm School, and the California School of Fine Arts, is 11,158. The total number of undergraduate students in the departments at Berkeley, including both men and women, is 6,214. The total number of graduate students in the departments at Berkeley, both men and women, is 800. On November 1, 1918, the percentage of men students in the departments at Berkeley was 45.98 and of women, 54.02.

California Vulture. See CONDOR.

Calig'ula, Caius Cæsar Augustus Germanicus (12-41), the third Emperor of Rome and successor of his uncle Tiberius. During the first part of his reign he was a mild ruler and lavish in his expenditures. As long as these conditions continued he was very popular. In the latter part of his reign his mind was affected because of a disease, and he became extremely cruel and tyrannical, even considering himself a god and compelling sacrifices to be offered to himself. He was finally assassinated.

Calix'tus, the name of three popes. Calixtus I suffered martyrdom. Calixtus II was pope from 1119 to 1124. He expelled Gregory VIII from Rome and concluded with Henry V of Germany the Concordat of Worms. Calixtus III was pope from 1455 to 1458. He attempted to organize a crusade against the Turks, but failed.

Calla, *Kal' la,* a marsh plant of the Arum Family, peculiar from the fact that what seems to be the flower is really only an enveloping sheath, or spathe, about the true flowers, which are borne upon a fleshy stalk called the spadix. The spathe is twisted in funnel form about the spadix, and is pure white within and greenish without. The flowers themselves are insignificant, and lack petals. The deep green, heart-shaped leaves, as well as the flowers, remind one of its near kin, the Egyptian calla, wrongly called "calla lily." The Egyptian calla is a cultivated plant brought from the Cape of Good Hope.

CALLA

Callao, *Kahl yah' o,* the principal seaport of Peru, situated on Callao Bay, 7 m. w. of Lima. Its harbor is one of the best on the Pacific coast of South America, and the new town that sprang up after the disastrous earthquake of 1746

has good streets, modern conveniences and many public buildings. The leading manufactures are sugar, lumber, iron, copper and hides. It is a regular port for foreign steamship companies, the chief exports and imports of Peru passing through its harbor. Population is estimated as about 40,000.

Callicrates, *Kal lik' ra teez,* an Athenian architect living in the fifth century B. C. He was a contemporary of Ictinus, who assisted him in the construction of the Parthenon upon the Acropolis of Athens.

Calliope, *Ka li' o pe,* the Muse with the silver-toned voice, daughter of Jupiter and Mnemosyne. She presided over eloquence and heroic poetry, and was usually represented as crowned with laurel and holding either a parchment roll or a trumpet. She is said to have borne Orpheus to Apollo.

Callisto, *Ka lis' to,* daughter of King Lycaon of Arcadia, was a votary of Diana and beloved by Jupiter. Jealous Juno changed her into a bear, in which form she was one day found by her hunter son, Arcas. As he was about to kill her, Jove interfered, placing mother and son in heaven as the Great and Little Bear. This honor so enraged Juno that she obtained a promise from the ocean divinities, Tethys and Oceanus, that these constellations should never come into their waters. And so, to this day, the Great and Little Bears never set.

Calms, Regions of, a term applied by sailors to that part of the oceanic area in the region of the equator usually characterized by absence of wind, but which is sometimes visited by local squalls, thunderstorms and rainstorms and baffling winds. These areas are sometimes called doldrums. The doldrums shift their position with the season. In July, August and September they are farthest north, and in January, February and March, farthest south. Within these areas the temperature is higher and the humidity greater than anywhere else on the ocean, and the surface of the water is smooth like glass, with a thin layer of scum or oily waste, such as is seen on all stagnant water. Before the accurate charting of these areas the doldrums were the dread of sailing vessels, which in earlier times were frequently becalmed here for weeks at a time. The position of the doldrums between the regions of the northeast and southeast trade winds has led to the belief that the upper currents which move with the general circulation of the atmosphere, from the equatorial regions to the poles, have their starting point here.

Cal'omel, a white powdery substance known chemically as mercurous chloride and used medicinally in liver diseases and as a remedy for worms. It is prepared by heating corrosive sublimate and mercuric oxide together with common salt. Since it easily generates corrosive sublimate, a powerful poison, it must be taken with great care and always under the direction of a physician. Calomel is found free in Mexico and Spain in the form of hard, white crystals known as horn mercury.

Calorie, *Kal'o ry.* See CAL"ORIM'ETRY.

Cal"orim'etry, the measurement of quantities of heat. Heat being a form of energy, a quantity of heat can be measured in the ordinary units of work, as ergs, foot-pounds, etc. But for many purposes it is more convenient to have a unit based upon the heat required to raise the temperature of a given amount of water a certain number of degrees. There are two such units in common use: the gram calorie and the British Thermal Unit (B. T. U.). The calorie is the amount of heat required to raise the temperature of one gram of water from 15° to 16° on the Centigrade scale. It is the metric unit and is used in nearly all scientific work. The B. T. U. is the amount of heat required to raise the temperature of one pound of water from 60° to 61° on the Fahrenheit scale. This is the unit employed in most engineering work by English-speaking peoples.

The amount of heat required to raise the temperature of a body depends upon three things: the mass of the body (commonly, but incorrectly, called its weight); the nature of the body as determined by

what is called its specific heat; and the rise in temperature. The heat required, expressed in calories, is numerically equal to the product of the mass of the body in grams, its specific heat, as defined below, and the temperature rise in degrees Centigrade.

The *specific heat* of a substance is the amount of heat, measured in calories, required to raise the temperature of one gram of it one degree C. The specific heat of water is one at 15½° C. and is approximately one at all other temperatures. It is greater than that of any other substance except hydrogen, and for reasons of convenience is used as the standard.

Under certain conditions heat may be imparted to a body without changing its temperature. For example, much heat is required to change ice at 0° C. to water, which is still at 0° C. Similarly, a large amount of heat is required to convert water, already at the boiling temperature of 100° C., into steam still at 100° C. Conversely, when steam is condensed into water at the same temperature, or when water is frozen to ice at the same temperature, heat is given off by the condensing or freezing mass. The number of calories required to melt one gram of a solid without changing its temperature is called the (latent) heat of fusion of that substance. The number of calories required to vaporize one gr .m of a liquid without changing its temperature is called the (latent) heat of vaporization of that substance. The heat of vaporization of a substance varies considerably with the pressure and the resulting temperature at which vaporization occurs. Thus, to vaporize one gram of water at atmospheric pressure and at a temperature of 100° C. requires 536.5 calories; while to vaporize it in a high-pressure steam boiler at a temperature of 200° C. requires only 464.3 calories. The heat of fusion of a substance is practically the same under all conditions, though the temperature at which melting occurs varies slightly with the pressure.

Heat quantities are most commonly measured by imparting the unknown quantity of heat to a known mass of water and noting the rise in temperature of the water. For example, if a piece of iron weighing 300 grams and at a temperature of 85° C. be plunged into 500 grams of water at a temperature of 20° C., the water is warmed by receiving heat from the iron, and the iron is cooled by giving up heat to the water. Suppose the common temperature attained by the iron and water is 24° C. The heat received by the water is $500 \times 1 \times (24-20)$, or 2000, calories, which must be equal to the heat given up by the iron. Dividing this quantity of heat, 2000 calories, by the product of the mass and the fall in temperature of the iron, $300 \times (85-24)$, or 18,300, gives .109, which is the specific heat of the iron. Again, if a kilogram of ice at 0° C. be put into a kilogram of water at 80° C., it will be found that when the ice has all melted, the common temperature will be 0° C., showing that it requires as much heat to melt a piece of ice as it does to warm the same weight of water from 0° C. to 80° C. or near the boiling temperature. In other words, the heat of fusion of ice is shown to be 80 calories.

Cal'umet, Mich., a township of Houghton Co., 17 m. n.e. of Houghton and 7 m. from Lake Superior, on the Mineral Range and the Copper Range railroads. It is situated on Keweenaw Peninsula, celebrated for its mineral wealth. The Calumet and Hecla and other famous copper mines are on this peninsula and furnish copper not surpassed by any other copper mines in the world. Included in the Township of Calumet are the villages of Laurium and Red Jacket, which are governed by village officers. Yellow Jacket and Blue Jacket are unincorporated mining locations, which are governed by the township, the existence of the great mining companies having divided the township into a peculiarly managed unit or collection of units. Calumet is an important trade center, and there are various industrial establishments. Mining is the chief industry. Population in 1920, Laurium, 6696; Red Jacket, 4211; of Calu-

met Township, including the villages, 22,369.

Cal'vary, the name given to the spot outside Jerusalem where occurred the crucifixion of Jesus Christ. The original, that is, Hebrew, designation was Golgotha, both names signifying skull. It is usually identified with a small hill on the north side of the city. In Roman Catholic countries, the name Calvary is applied to a representation of the various scenes of the crucifixion, either in a chapel or a building adjoining the church.

Calvé, *Kal" va',* **Emma** (1864-); a dramatic soprano of note, born in Madrid of a Spanish father and a French mother. She studied in Paris and first appeared in opera in Bruges in 1882. Her fame began, however, with her appearance as Carmen in Covent Garden, London. She has made several tours of the United States, where she first sang in 1893.

Cal'vin, John (1509-1564), one of the leaders of the Protestant Reformation, born in Noyon, France. His father paid for his son's education in the household of the noble family of De Montmor. Young Calvin went with them to Paris at the age of 13, where he was distinguished for his scholarship. Giving up his intention of entering the priesthood, he began the study of law at Orleans in 1528, showing great proficiency in this direction. Theological questions, however, and especially the doctrines of the Reformers, soon attracted his attention. He spent the years 1531-32 in Paris and Orleans, and it is to this period that what he terms his "sudden conversion" must be assigned, which soon took him definitely into the ranks of Protestantism. Fleeing from Paris to escape persecution, he led a wandering life for the next two years, coming to be recognized meanwhile as one of the foremost leaders of the Reform movement, both because of his power as a teacher and because of his consistent Christian life.

Calvin reached Basel in the autumn of 1534, where he was warmly welcomed by the band of scholars and theologians who were making of that city a modern Athens. Here, in answer to the calumnies of Francis I against the Reformers, he published in Latin, in 1536, the first edition of his famous *Institutes of the Christian Religion,* and addressed it to the King. It contained at first only six chapters, and was intended as a defense of the Reformers and as a brief manual of Christian doctrine. He greatly enlarged it in later editions, and himself translated it into French.

Now opens the second main chapter of Calvin's life. Passing through Geneva in 1536, he was persuaded by the preacher Farel to remain; and in this city, except for an interval of three years, the rest of his life was spent. He and Farel drew up a condensed confession of faith in 21 articles which the citizens, summoned in parties of ten each, were required to subscribe to under oath. The austerity of the life imposed led to determined opposition, and Calvin and Farel were banished from the city, the former going to Strassburg, where he resided for three years, exercising great influence as a preacher, lecturer on theology and organizer of the Church. The growing disorder and irreligion in Geneva led to Calvin's recall in the fall of 1541 and he was received with great enthusiasm. He came with the firm determination of establishing in the theocratic government of the city the form of Church polity which he had carefully matured at Strassburg. He recodified the Geneva laws and constitution and was the leading spirit in the life of the city for over 20 years.

His work was not accomplished, however, without serious opposition from the liberal element and continued theological controversies. The most noted of these was that which led to the condemnation and burning of Servetus for heretical teachings concerning the doctrine of the Trinity. The fact that this action was concurred in by the unanimous decision of the Swiss churches and city governments and the general voice of Christendom, even including the gentle Melanchthon, seems to exemplify the judgment of Coleridge that the death of

Servetus "was not Calvin's guilt especially, but the common opprobrium of all European Christendom." Renan, certainly not prejudiced in Calvin's favor, says that "he was the most Christian man of his time."

Under the constant strain of administration, controversies, teaching, preaching and writing, Calvin's health was undermined and he died in his 55th year, after several months of severe suffering, but continuing his work until the end. His intellectual powers were of the highest order, coupled with an indomitable will and lofty courage; at the same time he was austere, arbitrary and contentious. As an expositor of the Scriptures, his commentaries, including nearly all the books of the Old and New Testaments, place him in the first rank. His chief work as a Reformer was (1) to systematize the doctrines of Protestantism around the fundamental idea of the sovereignty of God, based upon the authority of the Scriptures; and (2) to found a new church organization which should be a bulwark of Protestantism by uniting the scattered forces of the Reformers. His *Institutes,* written at the age of 26, is remarkable alike for the maturity of mind which it displays and for its unprecedented influence upon contemporaries and posterity.

Calypso, *Ka lip'so,* a sea nymph dwelling on Ogygia with none but her attendants. When Ulysses was shipwrecked on her island, she detained him eight years, promising him immortality if he would stay with her forever. But at last Mercury brought commands from Jupiter for his departure. Though grieving, Calypso gave the hero tools with which to build a boat and furnished necessary provisions for his trip.

Camas, *Kam' as,* a low, delicate plant of the Lily Family, growing on the prairies from Ohio west. The plant grows from a scaly bulb and has a slender stem, which grows without leaves but bears many nodding blue flowers. Like most lilies the camas blossoms have six, curving petals, six stamens and a straight, fleshy pistil. The bulb is eaten by the Indians much the same as the onion. In the West the plant is known as wild squill, wild hyacinth or wild quamash; the last is its proper botanical name, from which, no doubt, its common name was derived.

Cambodia, *Kam bo' di a,* formerly an important kingdom of southeastern Asia, later a French possession. It has now a total area of 37,500 sq. m. and is bounded by Annam, Cochin China and the Gulf of Siam. The country is generally level, broken here and there by wooded hills. The principal river is the Mekong, which connects with the lake, Tonle Sap, of various levels during low and high water. Agriculture is the principal occupation, and silk weaving and the gathering of different kinds of woods from the forests are important branches of industry. The population numbers about 1,330,000, composed in part of Chinese and Annamite immigrants. Cambodia was in existence shortly after the beginning of the Christian Era and reached a high state of culture in the sixth and seventh centuries. It is a monarchy and has been under the protection of France since 1863.

Cambridge, *Kame' brij,* a small city of England and the seat of one of the two great English universities. It is situated 56 m. n.e. of London on the banks of the River Cam, a branch of the Ouse. The city lies mostly upon the eastern bank, although its suburbs have stretched to the farther side. Cambridge, lying in a low plain, owes its growth to its geographical location on the highway between eastern England and the midlands. Ruins of Roman and early British earthworks show that its position has always been considered strategic. Civic affairs of the city are administered by a mayor, 12 aldermen and 36 councilors. The university is the chief point of interest (See CAMBRIDGE, UNIVERSITY OF). Population, 38,379.

Cambridge, Mass., a city and one of the county seats of Middlesex Co., opposite Boston, of which city it is practically a suburb, on the Charles River and on the Boston & Maine and the Boston &

Albany and other railroads. Nine bridges cross the Charles River near this point. Electric car lines connect with all the adjacent towns and cities. Cambridge is delightfully situated in the midst of a beautiful plain extending from the river. The historic divisions are still locally known as Old Cambridge, North and East Cambridge, Mt. Auburn and Cambridgeport. The city has over five miles of shore frontage; the streets are broad and shaded with lofty elms, and there are many handsome residences and colonial mansions. Among the prominent buildings are the public library, Cambridge Hospital, Rindge Manual Training School, and the massive stone and brick Courthouse of Middlesex County. Besides the interior parks, the river parks include the entire river front and add to the beauty of the city.

INSTITUTIONS. The educational institutions of Cambridge include Harvard University, the oldest and one of the best-endowed collegiate institutions in the United States, founded in 1636 (See HARVARD UNIVERSITY). In affiliation with Harvard University is Radcliffe College, founded in 1879 and giving instruction to women. The city is also the seat of the Protestant Episcopal Divinity School. Less than a mile from the university are the Harvard Observatory and botanical gardens. The Agassiz, Botanical, Mineralogical, Semitic, Germanic, Fogg Art and Peabody museums are connected with Harvard University and open to the public without charge. The Massachusetts Institute of Technology has purchased about 57 acres of land in Cambridge for the erection of new buildings.

INDUSTRIES. Among the industrial establishments are the Riverside, Athenæum and University presses, the last dating from the earliest printing house in the United States, founded in 1639. The *Bay Psalm Book,* printed in 1640, was the first book from this press. Other manufactures include organs, pianos, rubber goods, astronomical instruments, steam pumps, confectionery, ink, structural iron, druggists' preparations, men's clothing, lumber products, undertakers' supplies and foundry and machine-shop products. Cambridge is one of the richest cities in the United States in the per capita valuation of its municipal property.

HISTORY. Historically, Cambridge is one of the most interesting cities in the country. Craigie House, built in 1759, was Washington's headquarters in 1775-76 and afterwards became the home of Longfellow. Elmwood was the birthplace of James Russell Lowell. The city has been the home of such distinguished men as Oliver Wendell Holmes, Louis Agassiz, Charles Eliot Norton, Thomas Wentworth Higginson, Ellery Channing, Rufus Choate, Phillips Brooks and John Fiske. Cambridge is one of the oldest towns in New England. It was settled in 1630 and first took the name of Newtown. It was settled by Governor Winthrop, who intended it to be the chief place of the colony, but found Shawmut (Boston) better adapted for defense against the Indians. During the time Boston was held by the British army, 1775-76, Cambridge was occupied by the American army. Washington assumed command in 1775, under a large elm which is still standing. Cambridge received a city charter in 1846. Population in 1920, U. S. Census, 109,694.

Cambridge, Ohio, a city and county seat of Guernsey Co., 75 m. n.e. of Columbus and 55 m. n. of Marietta, on Wills Creek and on the Baltimore & Ohio, the Pennsylvania and other railroads. An interurban electric line also connects the city with Byesville, about 7 m. distant. The city is situated about 800 ft. above sea level in a coal, oil and iron region, which has large deposits of pottery clay. Natural gas is used for heating and lighting purposes. The city contains good municipal buildings, a courthouse, a number of banks, numerous churches, a Carnegie library and a children's home. The chief manufacturing establishments include iron and steel works, glass factories, furniture factories and potteries. The first settlement was made in 1806 by emigrants from the Island of Guernsey. The place was in-

corporated as a village in 1837 and a city charter was granted in 1893. Population in 1920, U. S. Census, 13,104.

Cambridge, University of, at Cambridge, England (1257). The first of its many colleges was founded in 1257; but the institution was in existence nearly as early as Oxford, and certainly at the beginning of the 13th century. It grew out of the federation of earlier colleges and was modeled largely after the University of Paris. Cambridge sends two representatives to the House of Commons. It maintains large libraries, museums and laboratories. Women may attend lectures in the university; and two colleges, Girton and Newnham, not affiliated with the university, have been established here for women. Certificates, rather than degrees, are granted by the university to women who attend its lectures and pass its examinations.

Cambyses, *Kam bī' seez,* (?-522 B. C.), the son of Cyrus the Great and his successor as King of the Medes and Persians. He added Egypt to the already vast dominions which his father had acquired, but during his absence a pretender seized the throne. Cambyses died while returning from his victorious campaign and before having opportunity to punish the offender.

Cam'den, Battles of, two battles of the American Revolution, the first fought on Aug. 16, 1780, between 3000 Americans under Gates and a force of 2000 British under Cornwallis and Rawdon. In attempting to surprise each other, the two armies suddenly came face to face. The Americans were completely routed, through the bad generalship of Gates.

The second Battle of Camden, or the Battle of Hobkirk's Hill, was fought on Apr. 25, 1781, between 1400 Americans under Greene and about 950 British under Lord Rawdon. The British were the aggressors, having left Camden to attack the Americans. Because of a misunderstanding, the central division of the American army turned in confusion, and the entire force retreated with a loss of 271 against a British loss of 258.

Camden, N. J., a city, port of entry and county seat of Camden Co., opposite Philadelphia, on the Delaware River and on the Amboy Division of the Pennsylvania Railroad. The city is also the terminus of the Atlantic City, the West Jersey & Seashore and other railroads. Several lines of steam ferries connect the city with Philadelphia. Camden has an area of ten square miles. Its Delaware River front extends beyond Cooper River on the north and to Newton Creek on the south, the latter separating it from Gloucester City. Cooper River is navigable beyond the city limits. Camden has a number of river and steamboat coasting lines and is noted for its immense market gardens, shipbuilding yards and manufactures.

Public Buildings. Among the more noteworthy buildings are the city hall, Camden County Courthouse, Y. M. C. A., Masonic Temple, banks and Federal Building. There are about 95 churches and missions.

Institutions. The educational institutions include four public libraries, a high school with well-equipped manual-training department, the Catholic Lyceum and several private schools. Other institutions include the Cooper and West Jersey Homeopathic hospitals, Camden Home for Friendless Children and West Jersey Orphanage.

Industries. Camden is an important shipping point and has extensive market gardens in the suburban districts. The docks and shipbuilding concerns cover a large area. There are manufactories of cotton and woolen goods, oilcloth, linoleum, paints, steel pens, foundry and machine-shop products, talking machines, boots and shoes, chemicals, asbestos, wall paper, morocco, yarns, worsteds and lumber products. There are also iron and steel mills, nickel works, potteries, brick and terra-cotta works and preserving factories.

History. The first settlers on the site of Camden came about 1679, but for many years after there was but a small settlement about the ferry, by which travelers crossed the Delaware to Philadelphia. These early settlers were largely

Quakers. Jacob Cooper laid out the site of the town in 1773 and called the place Camden in honor of Lord Chancellor Camden. The place was also known as Cooper's Ferry. Camden was the scene of several skirmishes between the British troops and the Jersey irregular militia during the Revolutionary War. The Camden & Amboy Railroad, incorporated in 1833, gave the city its early importance as a railroad terminus. Walt Whitman resided here from 1873 until his death in 1892. Camden received a city charter in 1828. Population in 1920, 116,309.

Cam'el, the typical member of the Camel Family, said by the Arabs to be the greatest gift of Allah. There are two nearly distinct species, the Bactrian camel and the dromedary. The Bactrian camel, distinguished from the dromedary by having two humps instead of one, may be said to be the pack horse of the desert and highlands, for, though it is awkward and has a jolting stride, it can carry packs of from 700 to 1000 lb. for days at a time, and shows the utmost patience and endurance. The head of the camel is set upon a long neck covered with shaggy hair, and each organ seems particularly fitted for desert life. The prominent eyes are protected from the sun by a heavy lid, the ears are small, the nostrils large, but may be closed at will against the desert sandstorms; the mouth is cartilaginous, having sharp front teeth and exceedingly blunt back teeth; thus the camel is enabled to eat the hard, thorny or cactuslike plants which form the chief vegetation along its routes of travel. The dust-colored body is ungainly, but its humps are true storehouses of nourishment upon which it subsists when food is scarce. Thus the camel driver sees that his beast's humps are in good condition before starting with it upon a hard journey. The long legs of the camel have also adapted themselves to the needs of its life; great callouses have formed at the knees from its continuous kneeling for the adjustment of burdens. Cushions have also appeared upon the feet to prevent their sinking in the sand and to give a springy tread.

The dromedary, which has the one hump, is the race horse of the desert. His coat is finer, his step lighter and his gait more swinging and easy. He is capable, too, of enduring thirst longer, and can travel 70 or 80 m. per day. He is not, however, so well fitted for carrying burdens. The camel, either dromedary or Bactrian camel, has been a boon to the desert peoples; not only has it been the sole means of transportation, but the living animal furnishes fuel and milk, and its hair, which is shed yearly, is suitable for making cloth, ropes and the best of paint brushes; dead, it provides leather, flesh and lime.

Solitary camels are at rare intervals met upon the Western deserts of the United States. They are supposed to be the remnant of a train introduced by Jefferson Davis when he was secretary of war under President Pierce. Davis believed that camels would prove useful as pack bearers, connecting the West with the East at the time of the rush of gold seekers to California. Although reports from the war department showed that the results were satisfactory, the rapid building of railroads to the coast rendered the camel unnecessary, and the last members of the train are said to still wander in lonely exile in the lessening deserts of the West.

Camel'opard. See GIRAFFE, *Ji raf'*.

Cameo, *Kam' e o,* a gem or stone carved in relief, that is, with raised figures. When the figures are hollowed out, the stone is called intaglio. Although seals carved with the sacred beetle were made in Egypt from the earliest times, true cameo cutting was not practiced until the third century, B.C. The ancients commonly used a stratified stone for cameos, cutting in such a way that the object was wrought out upon a background of a different color or a different shade of the same color. Onyx, sardonyx and agate were commonly used to give this effect.

Camera Lucida, *Lu' sid a,* an instrument for drawing in perspective. In its simplest form it consists of a thin slip of plain glass held close to the eye and at such an angle that the rays of light

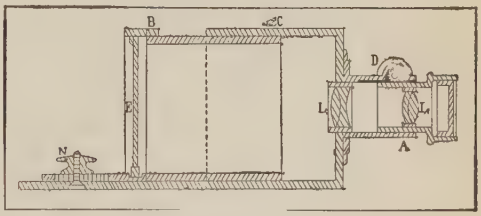
from the object are reflected by the glass into the eye, and at the same time the observer can look directly through the glass to a piece of paper held at a distance, usually ten inches, from the eye. In this manner the observer sees a virtual image of the object apparently projected onto the paper, and with a pencil he can trace the outlines of the image on the paper. The instrument was formerly much used by draughtsmen before the invention of photography; it is still used by microscopists in making drawings of very minute objects under the microscope, especially the compound microscope. The microscope tube is placed horizontally and the camera lucida attached to the eyepiece at an angle of 45°, so that the light emerging from the eyepiece is reflected up into the observer's eye, and the observer, looking down through the glass, sees a virtual image of the object projected on his drawing paper, some eight or ten inches below the eyepiece.

In practice, the brightness of the image is greatly increased by having the slip of glass very lightly silvered, so that it will reflect the light more strongly and still permit the observer to see the drawing paper and pencil through it; or the glass may be heavily silvered and the silver removed from a small spot in the center, the more usual arrangement. One eye alone is used, the other generally being closed. See CAMERA OBSCURA.

Camera Obscura, *Ob sku'ra,* an apparatus for projecting a real image of the landscape upon a horizontal screen in a darkened room. In its simplest form it consists of a long-focus lens and a plane mirror mounted above the darkened room and with the axis of the lens horizontal. The rays of light from near-by objects, such as trees or people walking about, pass through the lens and strike the mirror set at an angle of 45°, by which they are reflected down through an opening into the darkened room. The distance of the lens from the screen is so adjusted that a real image of the outside objects is sharply focused on the screen, which is usually placed on a table in the center of the room. The lens and mirror are rigidly connected together and are covered so that the only light entering the room is that which passes through the lens and forms the image. The lens and mirror together are capable of movement so as to be pointed in any desired direction, thus enabling an image of any part of the surrounding landscape to be projected upon the screen.

Before the development of photography, the camera obscura was frequently used in sketching from nature; it is now rarely seen except as an attraction at pleasure resorts. It has recently come into use again, however, under the name of the periscope, an instrument employed on submarine vessels.

Cam'era, Photographic. The essential parts of a photographic camera are the lens and the light, tight box with a place for inserting a sensitive plate or film. The lens is placed in an opening on one side of the box, so that light from the object to be photographed passes



CAMERA

through the lens and forms a real inverted image of the object on a screen at the opposite side of the box. The box may be made with bellows walls so as to permit the distance between the lens and the screen to be altered until the image formed there is sharp, that is, in focus, or the lens may be mounted with rack and pinion, and part or all of the focusing be done by moving the lens in and out. In many small cameras, called universal focus cameras, there is no adjustment of the difference between lens and screen, or sensitive plate, the fixed distance being chosen so that the images of all objects distant more than five or ten feet from the camera are sufficiently well in focus without adjustment.

In the illustration A is the tube containing the lenses L L. B and C represent the telescope box and E is the ground-glass screen upon which the picture is focused. In taking the photograph this is replaced by the sensitive plate. D is the rack and pinion for focusing the object and N the screw by which the camera is fastened to its base.

The screen on which the image is formed is usually of ground glass and arranged so that the operator can examine the image and adjust the focus and the view included to suit. The sensitive plate, or film, in a light, tight holder, is then inserted in place of the screen, and the lens capped or its shutter closed. The cover of the plate holder is then withdrawn and light admitted through the lens long enough, usually a fraction of a second, to affect the sensitive plate; the cover is then replaced and the plate in its holder is ready to be developed. In many hand cameras, no ground-glass screen is used, the focusing being done by setting the lens by a scale marked according to the distance of the camera from the objects to be photographed. See PHOTOGRAPHY; LENS.

Cam'eron, Simon (1799-1889), an American statesman born in Lancaster County, Pa. Left an orphan at an early age, he began to learn the printer's trade when nine years old, and in 1820 became editor of a paper. He served in the United States Senate from 1845 to 1849, from 1857 to 1861, and from 1866 to 1877. In 1861-2 he was Lincoln's secretary of war and advocated the vigorous prosecution of the war. He was minister to Russia in 1862. At first a Democrat, Cameron later became identified with the People's Party and joined the new Republican Party upon its organization, becoming exceedingly influential in its counsels.

Camillus, *Ka mil' us,* **Marcus Furius** (?-365 B. C.), a Roman patrician and consular tribune. During the Veientine War he was made dictator. He captured the city of Veii in 396 B. C. after ten years of resistance on the part of the town. In 394 B. C. Camillus was again elected consular tribune, and by an act of kindness secured the unconditional surrender of the Falerii. He lost favor with the Roman people at this time, and fled to the retirement of Ardea. After the destruction of the whole of Rome, except the capitol, by the Gauls, he was recalled and again made dictator. He expelled the invaders, rebuilt Rome and achieved new victories. In 368 B. C. Camillus was elected dictator for the fourth time, and abdicated almost at once. But when war with the Gauls again broke out he accepted a fifth dictatorship, though 80 years old, defeated the enemies of Rome, made peace between the patricians and plebeians, erected a temple to Concord and retired.

Camoens, *Kam' o enz,* **Luis Vaz de** (1524-1580), a Portuguese poet, born probably in Lisbon. His life was alternately that of a soldier and a poet, and some of his noblest works were written while he was in prison, in exile or struggling with intense poverty. The *Lusiad,* an epic dealing with events of Portuguese history, is full of the fiery spirit of patriotism, is done in so admirable a manner, touched with so much of poetry and imagination, and is written with such elegance and perfection of diction, that it ranks among the masterpieces of world literature. His shorter love lyrics and national sonnets possess magnificence and power, and reveal Portuguese poetry at the height of perfection.

Camomile, *Kam' o mile.* See CHAMOMILE.

Camorra, *Kah mor'a,* a secret society which was at one time all-powerful in the Kingdom of Naples. The society often employed unlawful means to secure its ends and resorted to blackmail and even murder whenever these measures were deemed necessary, but the work was done so secretly that the perpetrator of the deed could not be discovered. After the formation of United Italy the society lost much of its influence; however, for more than 100 years it continued to protect vice in and about Naples. Meantime the government took vigorous measures to overthrow the or-

ganization. The climax was reached in 1911 when 20 of the leading members were arrested and brought to trial for a particularly atrocious murder which had been committed some years before. The trial ended in March, 1912, with the conviction of all the prisoners, some of whom were sentenced to long terms of imprisonment. It was the opinion in Italy that this trial would lead to the disbanding of the order.

Campan'ula, a class of herbs of the Bellflower Family, regarded more for the beauty of their flowers than for any practical use. They are recognized by their milky juice, leaves which occur in alternate arrangement on the stem, and blue, showy flowers which hang like bells on a more or less leafy stalk. They are found throughout the United States and are represented in tropical countries by a number of species. The stems are generally erect, though in the case of the harebell they are slender and extremely delicate. In spite of their delicacy, however, these plants are found in the most rugged situations and in the crevices of rocks where but little soil or moisture can be found.

Canterbury bells is a common representative of the campanula. It is a sturdy plant and blooms year after year in the same place, in unkept dooryards or weedy roadsides. The flower stalk of Canterbury bells is more densely set with bells than that of the harebell, and those at the lower part of the stalk are generally larger.

Perhaps the prettiest species is the bellflower, which has almost stemless bells drooping in alternate arrangement on the stalk. As these bells sway in the breeze they seem fairly to chime, so much do the dainty blossoms with long-knobbed pistils resemble true bells.

These, with a single-flowered harebell, which grows in sandy soils, are the typical campanulas. They are always pleasing plants when growing, but wither quickly when cut, as if they recognized that, like most wild flowers, to be enjoyed most they must be seen and known in their chosen haunts.

Campbell, *Kam'bel,* **Alexander** (1788-1866), the founder of the denomination called the Disciples of Christ, formerly Campbellites, was born in Ireland, came to the United States in 1809 and settled in Pennsylvania. He was for a time pastor of a Presbyterian Church, but early followed his father, Thomas Campbell, in regarding the Bible as the sole authority in religious matters. He advocated a larger unity among churches, and began to agitate union of Christians upon the foundation of the teachings of the New Testament, without regard to other creeds. The Church known as the Disciples of Christ, or Christians, grew out of this movement. Campbell was editor successively of *The Christian, The Baptist* and the *Millennial Harbinger.* He founded Bethany College in West Virginia and was its president until he died. See CHRIST, DISCIPLES OF.

Campbell, Sir Alexander (1822-1892), a Canadian statesman, born in Yorkshire, England. In 1843, at the age of 21 years, he began the practice of law, and 13 years later was made queen's counsel. He entered the Legislature in 1858 and was elected speaker in 1862. During the years from 1864 to 1867 he was commissioner of crownlands; he became a member of the Quebec Conference in 1864 and received an appointment to the Dominican Senate in 1867, when he was the government leader. In 1897 he was given a place in the Queen's Privy Council. In Sir John Macdonald's first cabinet he was postmaster-general and was made minister of the interior in 1873. Resigning on account of the Pacific Railroad scandal, he was made minister of militia and defense and postmaster-general, upon Macdonald's return to power. Campbell in 1881 was made minister of justice and became lieutenant-governor of Ontario in 1887. He represented Canada in the conference held in London in 1887 concerning imperial federation.

Campbell, Beatrice Stella Tanner (Mrs. Patrick Campbell) (1867-), an English actress, born in London. She first gained prominence at the Adelphi Theater, London, and later played suc-

cessfully both in England and America. Her remarkable impersonations in Pinero's *Second Mrs. Tanqueray,* in *Macbeth, Magda* and in Davidson's *For the Crown* brought her into the first rank of English actresses.

Campbell, Sir Colin (1792-1863), a distinguished British general, the son of a Glasgow carpenter. He took part in the war with China in 1842. In the Crimean War he was in command of the Highland Brigade and was chiefly responsible for the victory of Alma; he also headed a gallant repulse of the Russians at the Battle of Balaklava. When the Sepoy Rebellion broke out in India in 1857, Campbell was made commander-in-chief. He accomplished the relief of Lucknow in November, and by December, 1858, the rebellion was crushed. Five months before, he had been made Lord of Clyde, and the next year, when he returned to England, he was made a field marshal and was given a pension of $10,000. He was buried in Westminster Abbey.

Campbell, Thomas (1777-1844), a Scottish poet, born in Glasgow. He distinguished himself in the University of Glasgow by his poetic translations from the Greek, and in 1799 the publication of his *Pleasures of Hope* brought him immediate fame. Later poems did not materially increase his popularity. He traveled in Germany, was editor of the *New Monthly Magazine,* assisted in founding the University of London and was rector of Glasgow University from 1826 to 1829. Among his poems are *The Exile of Erin, Ye Mariners of England, The Battle of the Baltic* and *Gertrude of Wyoming.*

Campbell, William Wilfred (1861-1918), a Canadian poet, born in Berlin, West Ontario. He studied in Toronto and in Cambridge, Mass., was ordained to the Episcopal ministry in 1885 and became rector in St. Stephen, New Brunswick, three years later. In 1891, receiving an appointment in the civil service, he removed to Ottawa. The poetry he was publishing at this time attracted attention because of its spontaneity and freshness. His favorite themes are patriotism and love of nature. He has written *Lake Lyrics and Other Poems, Beyond the Hills of Dreams, Victoria, England, The World Mother, The Lazarus of Empire, Mordred* and *Hildebrand.*

Campbell-Ban'nerman, Sir Henry (1836-1908), a British statesman, the son of Sir James Campbell, lord provost of Glasgow. He was educated at Glasgow University and at Trinity College, Cambridge. He entered Parliament in 1868; was financial secretary at the war office, 1871-1874, 1880-1882; secretary of the admiralty, 1882-1884; and chief secretary for Ireland, 1884-1885. In 1872 he took the name of Bannerman in compliance with the terms of a will of his maternal uncle, who left him a large property. During Gladstone's ministry, 1892-1895, he filled the same office, and while thus engaged in public service he won the respect of all parties. In 1898 he was chosen leader of the Opposition in the House of Commons. He favored Home Rule and opposed the Boer War, and when the Salisbury ministry was compelled to resign in 1905, the King called Campbell-Bannerman to form a new ministry. When he became prime minister, his popularity enabled him to unify the various factions in the Liberal Party. His administration was one of remarkable success, but failing health compelled him to resign, and he died soon after his resignation.

Camp Fire Girls, an organization of girls between ten and 20 years of age, founded in New York City in 1911 by a committee, of which Dr. Luther H. Gulick was chairman. The movement proposes to do for girls along their line of activities what the Boy Scout movement does for boys (See Boy Scouts of America). The organization includes three degrees: the wood-gatherers, the fire-makers and the torch-bearers. To become a wood-gatherer a girl must learn to repeat the law of the organization: "Seek beauty, give service, pursue knowledge, be trustworthy, hold on to health, glorify work, be happy." The require-

ments to become a wood-gatherer are very simple; but before a wood-gatherer can become a fire-maker, an extended preparation covering a somewhat wide range of activities is necessary. The fire-makers must: 1. Help prepare and serve, together with the other candidates, at least two meals for meetings of the Camp Fire. Two meals prepared in the home without advice or help may be substituted. 2. Mend a pair of stockings, a knitted undergarment and hem a dish towel. 3. Keep a written classified account of all money received and spent for at least one month. 4. Tie a square knot five times in succession correctly and without hesitation. 5. Sleep with open windows or out of doors for at least one month. 6. Take an average of at least half an hour daily outdoor exercise for not less than a month. 7. Refrain from sodas and candy between meals for at least one month. 8. Name the cause of infant mortality in summer. Tell how and to what extent it has been reduced in one American community. 9. Know what to do in the following emergencies: clothing on fire; person in deep water who cannot swim, both in summer and through ice in winter; open cut; frosted foot; fainting. 10. Know the principles of elementary bandaging, and how to use surgeon's plaster. 11. Know what a girl of her age needs to know about herself. 12. Commit to memory any good poem or song not less than 25 lines in length. Know the words to *America*. 13. Know the career of some woman who has done much for the country or state.

It is the ambition of every girl who joins the organization to reach the highest degree, and the plan for attaining this end stimulates the girls to persistent activity. When one becomes a fire-worker, it is comparatively easy to become a torch-bearer, or leader. The torch-bearer's motto is

"That light which has been given to me
I desire to pass undimmed to others."

The leader of each local organization has the title of Guardian of the Fire and must obtain a license from the national headquarters before she can found a camp. From its inception the organization has been very popular and it has grown rapidly.

Camphor, *Kam' fer,* a milky-white, gummy solid obtained from the wood and bark of the camphor tree, a member of the Laurel Family. It is prepared by distilling the wood by steam and purifying the resulting gum. Camphor is familiarly known in liquid form, since it dissolves readily in ether or alcohol, and is thus commonly used medicinally as a sedative or in small doses as a stimulant. Its odor is strong and pleasing and its taste cooling. Camphor gum is placed in furs and clothing to protect them from insects. It is also used in the manufacture of celluloid and of many explosives. The camphor tree is a native in southeastern Asia and is cultivated in Japan, Formosa and elsewhere in the tropics.

Campus Martius, *Kam'pus Mar'shi us,* a plain between the bend of the Tiber and the Quirinal and Capitoline hills. It was devoted to military exercises. Later it was like a beautiful park with walks, baths and theaters. Modern Rome is chiefly built upon this plain. See map in the article ROME, ANCIENT.

Cam'wood, the wood of a small tree of the Pulse, or Pea, Family, the name being probably a contraction for campeachy wood. The wood is exceedingly hard, and from it a brilliant but soluble red dye is produced. This dye, with a solution of iron, is used in coloring bandanna handkerchiefs. The wood is used in construction and cabinetwork. The camwood tree is a native of Africa. The camwood is sometimes called redwood or barwood.

Canaan, *Ka' nan,* the name given by Old Testament writers to the land west of the Jordan which the Israelites occupied after their emergence from the wilderness. Canaan is generally identified with Palestine, and to the ancient Hebrews it was the Promised Land. See PALESTINE.

Canaanites, *Ka' nan ites,* the general name for the heathen peoples dwelling west of the Jordan, whom the Hebrews

subdued after they occupied the Promised Land. They included the Jebusites, Hittites, Amorites and others. The name Canaanites is applied also, in a restricted sense, to one of these peoples. We do not know to what race they belonged.

CAN′ADA, DOMINION OF

GENERAL DESCRIPTION

Position. The Dominion of Canada occupies all of North America north of the United States, with the exception of Alaska, Newfoundland, a small strip along the Labrador coast and Greenland. It is bounded on the n. by the Arctic Ocean, on the e. by the Atlantic Ocean, on the s. by the United States and on the w. by the Pacific Ocean and Alaska. The boundary on the south is irregular. Between the Pacific and the Lake of the Woods it follows parallel 49° of latitude; thence it follows a chain of lakes and rivers eastward to the mouth of the Pigeon River on Lake Superior; it then follows the deepest channel through the Great Lakes and the St. Lawrence River to Cornwall on the north bank of that stream. It then follows the parallel 45° of latitude eastward, forming the northern boundary of New York and Vermont, from whence an irregular line separates New Hampshire and Maine from Canada and reaches the Atlantic coast on the Bay of Fundy.

Area and Population. Canada occupies nearly all the northern part of North America and has an area of 3,729,665 sq. m., of which 127,755 sq. m. are water. The area exceeds that of the United States, including Alaska, by 112,000 sq. m. Canada is 30 times the size of the United Kingdom, 18 times the size of Germany or France and nearly as large as all Europe. Its greatest length from east to west is 3500 m.; its greatest breadth from north to south is 1400 m.; and its coast line is 13,000 m., or more than one-half the circumference of the earth. The distance from Halifax to Vancouver is greater than the distance from Halifax to London. The Dominion contains nine provinces: Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia, the territories of Yukon and the North West Territories. The population in 1911 was 7,192,338. From 1901 to 1911 there was a gain of 1,821,023, or 32 per cent.

Surface. The surface of Canada is naturally divided into five regions, each of which is characterized by its own geological formations. These are the Appalachian region, embracing the southeastern corner; the Valley of the St. Lawrence; the Laurentian Plateau, including the remainder of the eastern half of the Dominion and the region immediately west of Hudson Bay; the central plain, extending from the Laurentian Plateau west to Hudson Bay to the Rocky Mountains and from the Arctic Ocean to the United States boundary; and the Rocky Mountain region, extending from the main range of the Rocky Mountains to the Pacific Ocean. In this article only a general description of these regions as a whole is given. For a more detailed description, see the subhead *Surface* in the articles on the respective provinces.

The Appalachian Region. This region includes the provinces of Nova Scotia, New Brunswick, Prince Edward Island and the southeastern part of the Province of Quebec. The highlands consist of hills and low mountains, which are the northern extremity of the Appalachian Mountain system. The main axis of the system runs through the southeastern part of Quebec, where it is known as the Notre Dame Mountains, and culminates in Gaspé Peninsula, where the highest altitudes do not exceed 4000 ft. All the elevations have been worn down by erosion and present rounded summits with gently sloping sides, except in a few instances where abrupt cliffs occur. The valleys between the subordinate ranges are broad, with gentle slopes, and usually contain one or more meandering streams. The entire region presents a beautiful landscape, in which mountains, hills, valleys, streams, highly cultivated

farms, towns, hamlets and forest harmoniously blend. Numerous indentations of the coast furnish excellent harbors, the most important being the Bay of Fundy and the Gulf of St. Lawrence, the great waterway to the interior.

The Valley of the St. Lawrence. This is a flat and fertile plain lying along each bank of the St. Lawrence River and extending about 600 m. up the river from the city of Quebec. In the Province of Quebec the larger part lies south of the river and comprises the fertile region extending from Montreal to the Eastern Townships. In Ontario it comprises the region between the Laurentian Plateau and lakes Ontario, Erie and Huron. The entire plain has a highly fertile soil and a climate well suited to various branches of agriculture.

The Laurentian Plateau. This region surrounds Hudson Bay, extends westward to meet the central plain and on the east includes the northern part of Ontario and Quebec and the Labrador Peninsula. It is the oldest part of the North American Continent. Its general shape is that of an irregular V or U, with a broad opening at the mouth. It is the largest surface division and covers an area of about 2,000,000 sq. m. In most of the region granite and gneiss predominate. It also contains extensive deposits of valuable ore, including iron, silver, cobalt, nickel and gold. The former high mountains have been reduced by erosion and weathering, so that there are no lofty elevations except along the coast of Labrador, where several summits of the Nachvak Mountains reach an altitude of about 6000 ft. In general, the surface is hilly and the valleys contain a large number of lakes. Although usually spoken of as a plateau, a large part of it has an altitude of less than 1000 ft. This great lowland portion extends all around Hudson Bay, varying from 100 m. to 500 m. in width, thence southwestward to Lake Winnipeg.

The Central Plain. The central plain of Canada includes the northern portion of the Great Central Plain of North America, which extends from Mexico to the Arctic Ocean. At the United States boundary it is 800 m. wide, but it gradually narrows until at its northern extremity it is about 300 m. in width. It lies between the Laurentian Plateau and the Rocky Mountains and includes most of Manitoba, a part of Saskatchewan and the greater part of Alberta. The lowest point is at Lake Winnipeg, where the altitude is only 800 ft. It rises by successive steps until in Alberta it attains an altitude of 4500 ft., where it meets the foothills of the Rocky Mountains. Nearly all of this vast region is well watered and covered with a fertile soil, capable of producing abundant crops of wheat, oats, barley, hay and vegetables, and affording pasturage for extensive herds of live stock.

The Rocky Mountain Region. This region extends from the main range of the Rocky Mountains to the Pacific coast and is about 400 m. wide. It includes nearly all of British Columbia and all of Yukon Territory. The Rocky Mountains on the east and the Coast Ranges on the west are its two principal mountain ranges. Between them are numerous short ranges, chief among them being the Selkirk Mountains, the Caribou Mountains and the Gold Ranges. These ranges are irregular in their trend and are separated by deep valleys, with precipitous sides, through which flow rushing mountain streams. Most of the peaks are crowned with perpetual snow and on many of them glaciers are found (See SELKIRK MOUNTAINS). The Coast Ranges in former times projected beyond the present coast line, and Vancouver and Queen Charlotte islands were formed by the partial submergence of this outlying range. The coast is rugged, irregular and deeply indented by fiords, closely resembling those of Norway. The highest altitudes in Canada occur in this region along the coast near the southern boundary of Alaska. They are Mt. Logan (19,450 ft.), Mount St. Elias (18,000 ft.). In the Rocky Mountains there are a number of peaks from 10,000 to 12,000 ft.; Mt. Robson has an altitude of 13,700 ft. In the Selkirks

are several peaks of 10,000 ft., and the highest in the Coast Ranges vary from 7000 to 9000 ft. The entire region is celebrated for the grandeur of its scenery, its magnificent forests, fruitful valleys and mountain streams.

Lakes and Rivers. *Lakes.* With the exception of Lake Michigan, which lies wholly within the United States, about one-half the area of the Great Lakes falls within the Canadian boundary. In addition to this vast body of water the country contains thousands of lakes varying in size from those hundreds of miles long and 1000 ft., or more, deep, to mere ponds known only in their immediate locality. The Laurentian Plateau and the region bordering upon it on the west are the most thickly strewn with lakes. Next to the Great Lakes those of the most importance are Great Bear Lake, having an area of 11,200 sq. m.; Great Slave Lake (10,100 sq. m.); Lake Winnipeg (9,400 sq. m.) and Lake Winnipegosis (2030 sq. m.). In all there are nine lakes over 100 m. long and 35 which are more than 50 m. long.

Most of the Canadian lakes are characterized by irregular shores and clear water, and many of them contain numerous islands. Georgian Bay alone is estimated to have over 30,000 islands, nearly all of which are clothed with rich verdure. With scarcely an exception the lakes have outlets and are fresh. Quill and Old Wives lakes in southern Saskatchewan and a few others have no outlets and are brackish. The lakes in the Rocky Mountain region are long, narrow and deep.

Rivers. The St. Lawrence, with its broad estuary extending far inland, is the most important river of Canada and one of the most important rivers of the world. The main stream is 755 m. long, but its real source is the St. Louis River, which flows into Lake Superior. Its chief tributaries are the Saguenay, 112 m. long; the St. Maurice, 400 m. long; the Ottawa, 750 m. long; and the Richelieu, 75 m. long.

North of the divide which separates the basin of the St. Lawrence from Hudson Bay and draining Labrador Peninsula are the East Main, the Big and the Great Whale, flowing into James and Hudson bays; the Ungava and the George, flowing into Ungava Bay; and the Hamilton, flowing into the Atlantic. The St. John has a length of 500 m., forms part of the boundary between Maine and New Brunswick and flows into the Bay of Fundy. On the west side of Hudson Bay the general trend of the surface is to the northeast, and the chief rivers flowing into this body of water on the west are the Churchill and the Saskatchewan-Nelson. Farther east are the Albany, the Moose and the Harricanaw. The Red and the Assiniboine flow into Lake Winnipeg and are drained by the Nelson into Hudson Bay.

The Mackenzie-Athabaska is the great system flowing into the Arctic Ocean. The former, having a length of 2400 m., is the longest river wholly within the Dominion. To the east of the Mackenzie are the Coppermine and the Great Fish rivers. The Peace River, having a length of over 1000 m., drains the northern part of Alberta into the Athabaska. The largest streams of the Rocky Mountain region are the Columbia, which flows into the United States, the Fraser and the Yukon, which flows into Alaska. Other streams worthy of mention wholly in British Columbia are the Skeena, the Thompson, the Kootenay, the Nass, the Stikine and the Liard.

Climate. Climatically Canada has been described as "a country of dry frost in winter, and of fruitful heat in summer, with numerous delightful climates between." If placed upon the map of Europe, Canada would extend from Rome to North Cape. In other words, the country has a range of latitude extending from parallel 42° to the Arctic regions. In so wide an extent of territory there is variety of climates, and the details are more properly given in the articles describing the respective provinces. The presence of the large bodies of water, Hudson Bay and the Great Lakes, modifies the extremes of temperature of large areas and also exerts an

important influence upon the rainfall. The Maritime Provinces are characterized by an equable climate, with moderate winters and summers free from extremes of heat, and with ample rainfall for agriculture. The climate of Quebec is varied, being cooler in the northern than in the southern part, but over the entire province the winters are cold and the summers warm and pleasant. The southwestern part of Ontario has mild winters and a higher average summer temperature than other parts of the province. In the northern part of the province the winters are severe, but in the southern part they are about the same as in northern New York. Snow usually remains on the ground from December to March or April, and the rainfall during the summer is ample for agriculture.

The Northwest Provinces have the typical continental climate of the region, the chief characteristics being a dry atmosphere, clear skies, a short hot summer and a cold dry winter. In the western part of Alberta the winters are more mild, owing to the influence of the Chinook wind (See CHINOOK). Stock usually winters without shelter, feeding on the native grasses. The rainfall varies from 17 to 13 inches, but most of the rain occurs during May and June, when most needed by the growing crops. In the southwestern part of Alberta there is an area where irrigation is necessary, but with this exception there is enough moisture for successful agriculture. The long sunny days of summer enable grains and vegetables to mature as far north as the Peace River Valley. Along the Pacific coast the climate is mild and equable, similar to that in the northern part of Great Britain. This is due to the influence of the prevailing southwest winds from the Pacific. In some sections the rainfall is heavy, averaging 100 inches on the Island of Vancouver. East of the Coast Ranges the mean temperature is somewhat lower than on the coast, but the winters are mild. On the west side of these mountains and the ranges farther east the rainfall is abundant, and they are clothed with dense forests, but on the east slopes the rainfall is light and they are nearly barren. Temperature varies with altitude, but everywhere the summers are cool and invigorating. The North West Territories, Labrador and the region immediately surrounding Hudson Bay have a cold, inhospitable climate and are uninhabitable.

Throughout the Dominion the climate is remarkable for its invigorating and health-giving qualities. "There may be climates where the seasons are more steady, more gradual and even milder; but for a pure elixir of sun and air, the tonic of out of doors, there is nothing that equals the Canadian summer."

VEGETABLE AND ANIMAL LIFE. For an account of the vegetable and animal life of Canada, see NORTH AMERICA, subheads *Plant Life* and *Animal Life*.

MINERAL RESOURCES

EXTENT. The mineral resources of Canada are extensive and varied, including mineral fuels, building material and almost every known metal of economic value. This much is known concerning those portions of the Dominion which have been surveyed, and there are extensive areas yet unexplored, which doubtless contain vast stores of mineral wealth. The Department of Mines of the Dominion Government is engaged in developing the mineral resources of the country.

COAL. Coal is the most valuable product of Canadian mines and occurs in large quantities in Nova Scotia, British Columbia and Alberta. The most extensive mines are in Nova Scotia, where more than half the Dominion's output is produced. The mines of British Columbia are next in importance, followed by those in Alberta. The coal of Nova Scotia and British Columbia is of the bituminous variety. The Alberta measures contain all varieties from anthracite to lignite, which is quite generally found throughout Alberta and Saskatchewan. The total output of all mines for 1911 was 11,291,553 tons, valued at $26,378,477, and is now about 15,000,000 tons.

PETROLEUM. The oil wells in Lambton and Kent counties, Ontario, have been

in operation since 1860. Some oil has been found in Alberta near the United States boundary, and in the northern part of this province along the Athabaska River the presence of tar sands indicates that the region is underlaid with oil-bearing rock. At present commercial production is confined to the Ontario region, which in 1910 yielded 315,895 barrels, valued at $388,550.

Natural Gas. There is a large region bearing natural gas around Medicine Hat in the southern part of Saskatchewan. Several gas fields have also been exploited in the southern part of Ontario. It is supposed that large areas in Quebec and the northern part of Alberta are underlaid by gas-bearing rock. These regions are awaiting development.

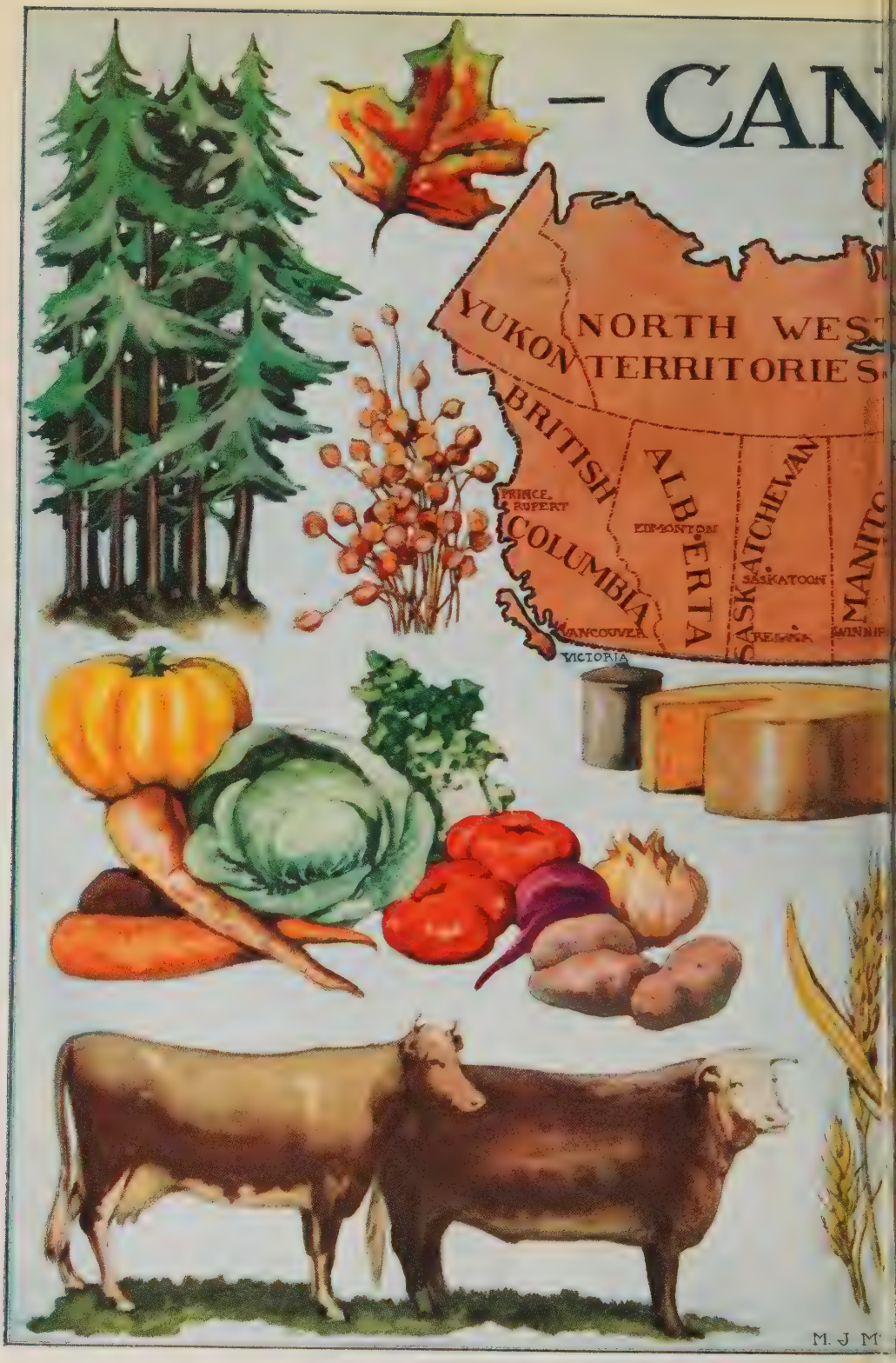
Gold. The Klondike regions in Yukon and British Columbia are the leading gold-producing regions. Up to 1907 the Yukon regions had yielded $120,000,000, and it is estimated that from $95,000,000 to $100,000,000 more can be obtained by the use of modern methods and mining machinery. Mining in this region has passed from the individual miner to the organized company requiring a large investment of capital. In British Columbia gold is found along nearly all streams, and since the discovery of gold in the provinces over $70,000,000 have been taken from these sources. The yearly output is now about $1,000,000. Gold has also been found along the streams in Saskatchewan and Alberta, and placer mining, to a considerable extent, is carried on over the North Saskatchewan for about 60 m. each side of Edmonton. Smaller placers are worked on the Peace, McLeod, Athabaska, Bow and other rivers. There are also placer mines on the Chaudière, De Loup and Gilbert rivers in Quebec. There are gold-bearing rocks in numerous localities in Ontario, and mines are worked in Hastings and Frontenac counties, in Timiskaming District and in other parts of northern Ontario. Similar rock also occurs in Nova Scotia and has been mined to a limited extent. The entire yearly output for the Dominion is about $15,000,000.

Silver. Most of the silver is obtained from ores in which it is combined with other metals, especially lead, copper and arsenic. Ores of this character are widely distributed throughout British Columbia, the deposits in West Kootenay, East Kootenay, Rossland and Boundary districts being the most valuable. There are important silver mines near the west end of Lake Superior in Ontario, and from one mine in the Thunder Bay District over $3,500,000 worth of metal have been taken. There are also extensive deposits of silver—cobalt-arsenic ores in the Cobalt District. The yearly production from all the mines amounts to about $20,000,000, of which Ontario produces over $19,000,000.

Copper. Most of the copper produced in Canada comes from British Columbia, where it is obtained from ore containing silver. North of Lake Superior in Ontario there are large areas of rock containing free copper, but they have not been worked. Considerable copper is obtained in the reduction of nickel ore at Sudbury, and in the Eastern Townships of Quebec are large deposits of ore containing a mixture of iron and copper pyrites. There are mines of considerable importance in this locality. The total yearly production of copper for the Dominion is over 100,000,000 lbs., valued at $30,000,000.

Nickel. The largest nickel mines in the world are at Sudbury, Ontario, and they supply more than one-half the world's output. The yearly product amounts to over $30,000,000.

Iron. Iron ore is widely distributed throughout the Dominion, but Nova Scotia, Quebec and Ontario are the only provinces in which there are smelters. On Vancouver Island are large deposits of high-grade magnetite, an ore from which the most valuable iron is produced. There are extensive deposits of clay-ironstone in Alberta; extensive deposits of hematite occur in Ontario, Quebec and Nova Scotia, all indicating that an inexhaustible supply of iron ore is ready



REPRESENTATIVE PR

STER

UCTS OF CANADA

for the smelter whenever the market demands it.

Asbestos. In the Eastern Townships of Quebec are the largest asbestos mines in the world, and from them the greater part of the world's supply is obtained. The annual output is valued at over $7,000,000. See Asbestos.

Clay and Building Stone. These materials are widely distributed. The clay is extensively used in making brick, and much of the limestone is suitable for making cement. There are valuable granite quarries in Quebec, and the limestone quarries near Montreal have furnished the stone of which many of the buildings in that city are constructed.

Other Minerals. Lead is produced in considerable quantities in British Columbia; salt is found in Ontario; there are valuable deposits of mica in Quebec; and graphite, manganese, corundum and gypsum are also found in various localities and in paying quantities.

FISHERIES

Extent. The fisheries rank as the fifth industry of the Dominion in value and importance. The annual catch amounts to about $40,000,000; the industry gives employment to over 93,000 people and has an invested capital of over $30,000,000. The fishing fleet comprises about 1700 vessels and 39,000 boats, manned by over 68,000 men. The leading fish taken, in order of value, are salmon, cod, lobsters, herring, halibut and haddock. The leading provinces are British Columbia, Nova Scotia, New Brunswick and Ontario. Cod, lobsters, herring and haddock are the most important fish taken off the Atlantic coast; on the Pacific coast but little attention has been given to other than salmon fisheries. The large inland lakes furnish large quantities of white fish, lake trout and sturgeon, while the streams and smaller lakes abound in bass and trout, game fish always attractive to the sportsman.

Administration. The fisheries are under the direct supervision of the Department of Marine and Fisheries of the Dominion Government, whose executive officer is the Dominion commissioner of fisheries. The government encourages the industry by paying bounties annually to the owners of vessels, vessel-fishermen and boat fishermen. Several scientific biological stations and over 37 fish hatcheries are maintained. Careful study is also made by the department of the best methods of curing the various kinds of fish. Government fish driers and bait-freezing stations for the preservation of bait have been established. The government has also erected reduction works for the purpose of manufacturing fish waste into guano, fish oil and other products, thus preventing the pollution of the water by the casting of this refuse into the sea. A fisheries protective fleet of about 16 vessels patrols the coasts of the Atlantic and the Pacific and of the Canadian portion of the Great Lakes to see that the laws regarding the preservation and taking of fish are enforced.

FORESTS AND LUMBER

Forest Areas. The forests of Canada cover an expanse of about 836,000 sq. m., or nearly 25 per cent of the entire area of the country, and constitute the largest forest area of any lumber-producing country in the world. There are two forest belts, that extending from Nova Scotia westward through New Brunswick, Quebec and Ontario and around Hudson Bay to Alaska and westward to the prairie region of the central plain, and the British Columbia belt, extending from the southern boundary of that province to the northern limit of forest growth. The first belt varies in width from 200 to 400 m. The most valuable commercial timber in this belt is white pine, spruce, hemlock, fir, cedar, maple, beech, birch, tamarack, basswood, poplar, elm, ash and hickory. The commercial timber of British Columbia consists chiefly of Douglas fir, spruce and red cedar.

As distributed among the provinces, British Columbia has the largest forest area, Quebec, the second and Ontario, the third, and the combined areas of

Manitoba, Alberta and Saskatchewan are about equal to that of British Columbia.

Forestry. When first settled, much of the land in the Eastern Provinces now under cultivation was covered with forests. Within recent years the demand for lumber has caused large areas in New Brunswick, Quebec and Ontario to be stripped of their forests, and in order to conserve properly this great source of wealth there was established the Dominion Bureau of Forestry. There is also a provincial bureau maintained by Ontario. The direction of the bureau is in charge of the Dominion superintendent of forestry, who employs a large corps of trained assistants. All forests on government land are under the supervision of this bureau, and those belonging to the provinces are under the supervision of their respective local governments. The Dominion bureau supervises cutting timber on government lands, employs foresters and rangers to enforce the laws and to prevent forest fires, makes surveys of government forests to determine their extent and value, makes provision for reforesting deforested regions and assists settlers in planting trees for windbreaks. Since establishing the bureau, over 16,000,000 trees have been furnished for this purpose, most of them going to the treeless prairies in the Northwest. The Canadian Forestry Association was organized in 1900 and exerts a strong influence in securing judicious treatment of forests and in establishing national forest preserves. The association publishes annual reports and a quarterly periodical, which contain valuable information.

Forest Reserves. The Dominion Government has set apart a number of forest reserves. They include the Riding Mountain Reserve, 1535 sq. m., the Pines Forest Reserve, southwest of the North Saskatchewan River in Alberta, 145 sq. m.; the Cypress Hills Reserve in west Saskatchewan; the reserve about Crowsnest Pass in Alberta; the Spruce Woods and Beaver Hills reserves in Manitoba; the Timagami and Mississagi reserves in Ontario; and the Laurentides National Park in Quebec. All national parks are also considered to be forest reserves.

Lumbering. The facilities for lumbering are excellent. The numerous streams and lakes throughout the forests of the Eastern Provinces afford ready and cheap transportation for the logs. These are usually cut during the winter and piled on the banks of streams or lakes, and in the spring they are floated down the streams to the mills. In British Columbia the larger size of the trees necessitates locating the mills in the forest where the logs are cut. Most of the mills are operated by water power at a great saving of expense over steam power. The entire timber cut in 1910 amounted to 4,900,000,000 board feet, valued at $77,000,000. Spruce and white pine each constituted one-fourth of the cut. In the order of output, Ontario is first, British Columbia second and Quebec third. The manufacture of wood pulp for paper consumes 1,500,000 cords of wood annually. About 60 per cent of this is shipped to the United States.

National Parks. In addition to the forest reserves, Canada has five national parks. They are the Rocky Mountains Park at Banff; Yoho Park, at Field; Glacier Park, at the summit of the Selkirks; Jasper Park, at Yellowstone Pass; and Wharton Lakes Park at International Boundary. Elk Island Park and Buffalo Park are fenced inclosures for the preservation of buffalo. All are under the supervision of the commissioners of Dominion parks.

AGRICULTURE

General Conditions. Conditions of soil, climate and geographical location make Canada preeminently an agricultural country. Fully 50 per cent of her population are engaged in practical agriculture and many others are engaged in occupations directly related to agriculture, such as the manufacture of agricultural implements, making butter and cheese and transporting agricultural produce. The cool temperate climate is adapted to the production of cereals and

One of the sources of wealth to the farmer.

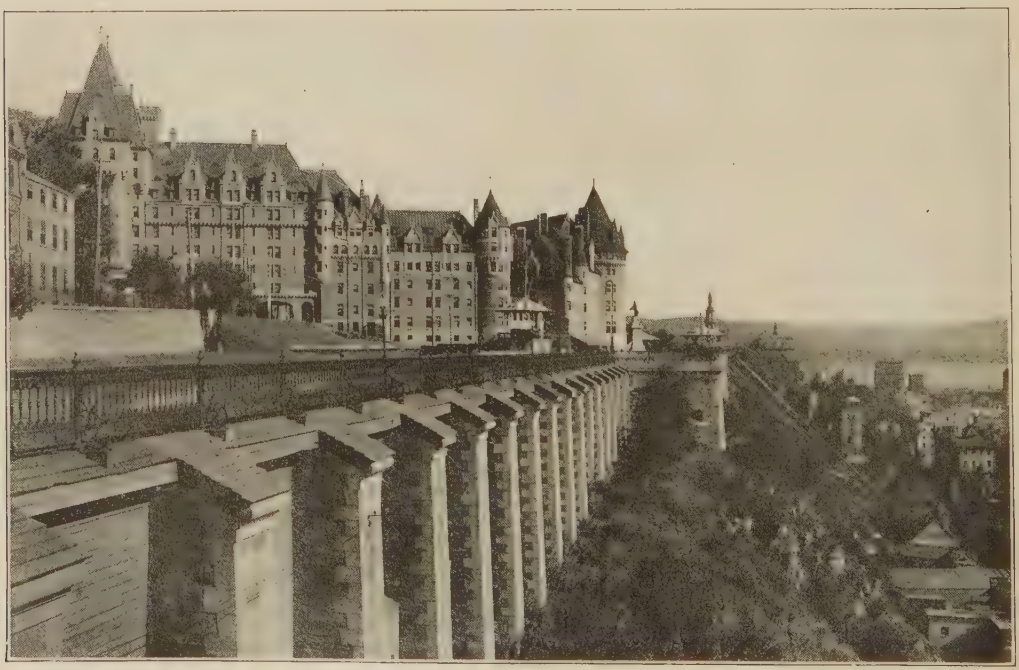
The wheat fields of Canada, when fully developed, can feed the world.

This shows the sort of homes the farmers are able to build.

VIEWS IN CANADIAN CITIES.

PARLIAMENT BUILDING, OTTAWA

The government buildings are the crowning architectural feature of Ottawa. The most imposing structure in the group is the Parliament Building, one of the finest structures in America.



DUFFERIN TERRACE, QUEBEC

Dufferin Terrace is a promenade 1400 feet long overlooking the St. Lawrence. To the right is seen a section of the lower town.

vegetables of excellent quality, and with scarcely an exception the soil is of a high degree of fertility.

Crops. The total value of the field crops for 1917 was $1,144,636,450, and the census estimate for the crop of 1919 was much greater. Wheat is the leading cereal in point of value and oats leads in quantity. In 1918, 189,301,350 bushels of wheat were raised, the leading provinces in the order of production being Saskatchewan, Manitoba, Ontario, Alberta and Quebec. The development of the wheat-growing regions in the Northwest Provinces is proceeding rapidly and the crop each year shows a marked increase over the preceding. Owing to the long sunny days wheat matures 800 m. north of Winnipeg, and the conditions of soil and climate produce grain of excellent quality. Canada is rapidly becoming one of the leading wheat-producing countries of the world. See Wheat.

In 1918 the oat crop amounted to 380,273,500 bushels, of which more than one-third was raised in Ontario. The other leading provinces in the order of production were Saskatchewan, Quebec, Manitoba and Alberta. Barley, rye, peas, buckwheat, flax and corn are also valuable crops. Most of the flax is raised in Saskatchewan and corn is found chiefly in the southern parts of Quebec and Ontario. Potatoes are raised in all provinces, the crop amounting to about 66,000,000 bushels. Garden vegetables succeed in all parts of the Dominion and sugar beets have been successfully introduced in several localities. In the Northwest Provinces raising wheat occupies most of the farmers' energies, but in other localities mixed farming is practiced.

Live Stock. In 1918 there were in all the provinces 3,609,257 horses, 3,543,600 milch cows, 6,507,267 other cattle, 3,052,748 sheep and 4,289,682 hogs. The total value of the live stock in 1919 was estimated at $1,000,000,000. Special attention is given to raising draft horses in Ontario and considerable attention is given them in the Northwest Provinces. The Clydesdale, the Shire and the Percheron are the breeds most generally found. Large numbers of coach and saddle horses are also raised. Horse ranching is an important industry in Alberta, especially in those sections where mild winters admit of wintering the stock without shelter. Cattle, sheep, hogs and poultry are found in large numbers in all provinces. For beef cattle, Shorthorns, Herefords, Galloways and Aberdeen-Angus are the principal breeds, and for dairy purposes Jerseys, Ayreshires, Guernseys and Holstein-Friesians are the most profitable. The prairies of the Northwest form excellent pasturage and upon them large herds are fattened for beef every year. Hogs are grown chiefly in those localities where special attention is given to dairying. Bacon is the most important hog product for export. Sheep are more generally raised in the Maritime Provinces than elsewhere, because other lines of agriculture are found more profitable. Careful attention is given to breeding, especially to maintaining high grades of horses and cattle, and the greatest precautions are taken against importation of diseased animals, nearly 70 inspection stations being maintained by the government for this purpose.

Dairying. Canada is an ideal dairy country. The cool climate, rich soil, providing excellent pasturage and fodder, and an abundance of pure water all contribute to the production of milk of excellent quality. The entire income from dairy products is about $100,000,000 a year, one-fourth of which is from exports. Canada is the leading country of the world in the manufacture of cheese, which is chiefly of the variety known as "Canadian cheddar." This cheese is an important food, one pound of it containing as much nourishment as two and one-fourth pounds of beefsteak. Large quantities of butter are also manufactured and exported. The butter and cheese for market are generally made in cheese factories and creameries. Large quantities of condensed milk are also prepared. All products for export are subject to strict government inspection, with the result that Canadian dairy products have ac-

quired a reputation which brings their manufacturers the highest price in European markets. The yearly exports average about as follows: cheese, $21,000,000; cream, $1,715,000; butter, $744,000; condensed milk, $470,000.

Fruit. The leading fruit-growing regions are in Nova Scotia, in the southern and western parts of Ontario and in British Columbia. In all these regions apples of excellent quality are raised, and in the Niagara Peninsula of Ontario and British Columbia peaches and pears are successful. Plums, cherries and small fruits of many varieties are grown successfully in many localities and supply most of the needs for home consumption.

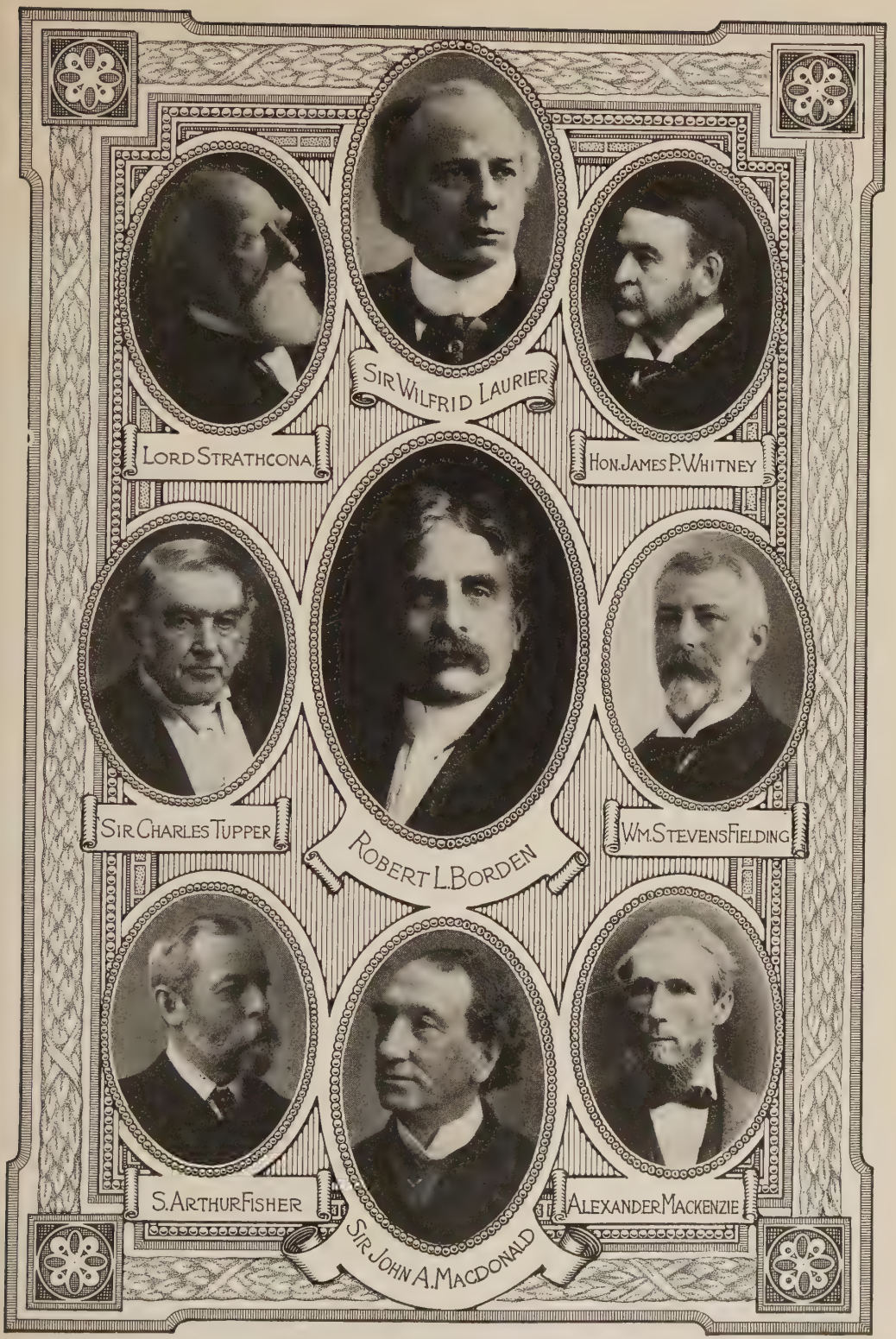
Government Aid. The Dominion Government renders the farmers valuable assistance along practically all lines of agricultural development. This work is in charge of the department of agriculture, at the head of which is the minister of agriculture, who is a member of the Dominion Parliament. Under the direction of the department experimental farms have been established in the various provinces, with a central farm at Ottawa. The central farm gives special attention to those problems that are of national import, and each of the other farms studies the problems pertaining to its immediate locality, as the farm in southern Alberta, which is giving special attention to irrigation and dry-farming. These farms experiment to discover the most profitable crops, the best variety of seed for their respective localities and also to determine what new branches of agriculture can be introduced to advantage. The department, through its live-stock branch, gives attention to breeding high-grade animals, and prevention of contagious diseases through inspection of domestic herds and by excluding diseased animals from importation. This branch is in charge of skilled veterinary officers, and owing to their care the country is practically free from rinderpest, pleuro-pneumonia and the foot and mouth diseases, and hog cholera has been nearly exterminated. A biological laboratory is maintained in which all diseases of domestic animals are carefully studied.

Another branch of the department gives special attention to the improvement of seed, thus raising the standard and increasing the production of the various crops throughout the Dominion. Attention is also given to extending the market for agricultural and dairy produce and holding annually an exhibition which contains the products from all the provinces. Information is furnished the farmers through the distribution of bulletins and through correspondence. Agricultural colleges are maintained by the provincial authorities at Guelph, Ontario; Truro, Nova Scotia; and Winnipeg, Manitoba. There are also provincial agricultural associations in the various provinces, each devoted to the interests of its own province.

Crownlands. There are still large areas of unoccupied lands in all the provinces except Prince Edward Island. In the Northwest Provinces these lands are chiefly owned by the National Government and are known as crownlands. They are open to settlement on liberal terms. See Lands, Public, subhead *Canada*.

MANUFACTURES AND COMMERCE

Manufactures. The manufacturing industries are increasing rapidly from year to year. The rapid development of agricultural and other interests produces a constantly increasing demand for manufactures, and the unlimited water power distributed throughout the country is favorable to the production of goods at a limited expense. The manufacture of lumber and lumber products, including wood pulp, is the leading manufacturing industry, and the annual output amounts to about 110,000,000. The production of iron and steel, which is carried on chiefly in Ontario, Quebec and Nova Scotia, is increasing from year to year, but is not yet sufficient to supply the demand, and large importations are necessary. Flour mills are being erected throughout the wheat belt and the manufacture of flour is rapidly increasing. The canning of fruit



CANADIAN STATESMEN

CANADIAN WRITERS

and vegetables is an important industry in the fruit-growing sections, as is the canning of fish and lobsters in the Maritime Provinces and British Columbia. The making of butter and cheese, which can scarcely be separated from agriculture, gives employment to a large number of people. In Montreal are large sugar refineries. Some textiles and some boots and shoes are made, and the manufacture of agricultural machinery and implements has become an important industry. Other industries worthy of mention are the production of Portland cement, the paper and printing trade, the manufacture of brick and other clay products and the production of malt and spirituous liquors.

COMMERCE. The chief foreign commerce of Canada is with Great Britain and the United States. The exports are principally agricultural produce, especially wheat, flour, dairy products and meats; lumber, wood pulp and some other raw materials for manufacture. Some coal is sent from Nova Scotia to the United States. The imports consist almost wholly of manufactured goods, especially textiles, clothing, boots and shoes, farm implements and other machinery. Canada has a preferential tariff with Great Britain and a strong protective tariff with other countries, with all of which she has more or less trade. The foreign trade for 1918 amounted to $2,548,713,538, of which $962,543,746 were imports, $1,586,169,792 were exports and $15,770,576 coin and bullion. There are no tariff barriers between the provinces and the domestic trade is much larger than that with foreign countries.

TRANSPORTATION AND COMMUNICATION

INLAND WATERWAYS. Canada is amply provided with inland waterways. The most important of these extends from the Great Lakes to the Atlantic Ocean, by way of the St. Lawrence River and connecting canals which have a combined length of 72 m. The entire distance from the Strait of Belle Isle to Port Arthur is 2233 m. Ocean-going vessels ascend the St. Lawrence to Montreal, and lake steamers, by use of the Welland Canal, can descend to that city without altering their cargoes. Were the canal locks larger and deeper ocean ships could readily pass between the Atlantic and ports on the Great Lakes. The yearly traffic passing over this route during the period of navigation is more than twice that passing through the Suez Canal in a year. See SAULT STE. MARIE, CANADA; SUEZ CANAL; WELLAND CANAL; ST. LAWRENCE RIVER.

Other canals in operation are the Rideau, extending from Ottawa to Kingston, a distance of 126 m., and the Trent Canal, extending from the mouth of the Trent River on the Bay of Quinte inland. The Georgian Bay ship canal to connect Lake Huron with the St. Lawrence at Montreal is projected, and if constructed will be the most stupendous work of the kind ever undertaken. It is estimated that this canal will be as important to Canada as is the Panama Canal to the United States. Its completion would virtually transform all the ports on the Great Lakes to seaports. Besides the St. Lawrence system there are a number of other navigable rivers for river craft. There are the Ottawa, the Saguenay, the Richelieu and the St. John in the Eastern Provinces, and the Fraser in British Columbia.

RAILWAYS. Canada has four great railway systems extending east and west, and each has numerous branches extending north and south. These systems are the Grand Trunk, the Intercolonial, the Canadian Pacific and the Canadian Northern. The Canadian Pacific has its line completed from ocean to ocean, and the completion of the Grand Trunk Pacific has given the Grand Trunk System like advantages. The Intercolonial serves the Maritime and Eastern provinces and has its western terminus at Montreal. The Canadian Northern serves the northern portion of the Northwest Provinces, as well as the Eastern Provinces. Several branch lines of the Grand Trunk System are planned.

ELECTRIC LINES. Besides the steam railways there are elaborate systems of

electric lines in all large cities, and in the smaller cities and larger towns of the more densely populated portions of all provinces. Many of these lines are interurban.

Ocean Routes. The indentations of the Atlantic coast provide a number of good harbors in Nova Scotia and New Brunswick, and the St. Lawrence provides a deep-sea waterway to Montreal. On the Pacific coast there are commodious harbors at Vancouver and Prince Rupert, the termini respectively of the Canadian Pacific and the Grand Trunk Pacific railways. Because of their high latitudes the Canadian ocean routes are much shorter than those farther south. Already the Canadian Pacific has its lines of steamers on the Atlantic connecting with European ports and on the Pacific connecting Vancouver with China, Japan and Australia. The most important seaports on the Atlantic routes are Halifax, St. John, Quebec and Montreal; and on the Pacific coast, Vancouver, Victoria, Prince Rupert and Esquimalt. Hudson Bay is free from ice four months in the year, and should a railway be constructed to its western coast, this would furnish a short and practical route for shipping to Europe most of the wheat of the Northwest. In 1919 Canada had about 30,000 m. of steam railways and over 1000 m. of electric railways.

Communication. The Canadian postal system is similar to that of Great Britain and is of the highest order. In 1917 there were 4,106 rural routes, and mails regularly reach all parts of the Dominion. There are about 60,000 m. of telegraph lines, with over 265,000 m. of wire. About one-fifth of the lines are under government ownership. The telephone is in common use, and in 1918 there were over 1,708,202 m. of telephone wires.

GOVERNMENT

The Federal Government. Canada is a self-governing nation within the British Empire. The present constitution under which the Federation was formed was framed by the British Parliament and was adopted in 1867, at which time the provinces of Ontario, Quebec, New Brunswick and Nova Scotia united to form the Dominion of Canada. Under the British North America Act, Manitoba was made a province in 1870. British Columbia was added in 1871, Prince Edward Island in 1873, and in 1905 Alberta and Saskatchewan became members of the Federation. The constitution reserves to the Dominion all powers not specifically delegated to the provinces. The powers thus conferred by the British North America Act are as follows:

(1) The public debt and property; (2) the regulation of trade and commerce; (3) the raising of money by any mode or system of taxation; (4) the borrowing of money on the public credit; (5) postal service; (6) the census and statistics; (7) militia, military and naval service and defense; (8) the fixing of, and providing for the salaries and allowances of civil and other officers of the Government of Canada; (9) beacons, buoys, lighthouses and Sable Island; (10) navigation and shipping; (11) quarantine and establishment and maintenance of marine hospitals; (12) seacoast and inland fisheries; (13) ferries between a province and any British or foreign country, or between two provinces; (14) currency and coinage; (15) banking, and the incorporation of banks and paper money; (16) savings banks; (17) weights and measures; (18) bills of exchange and promissory notes; (19) interest; (20) legal tender; (21) patents of invention and discovery; (22) bankruptcy and insolvency; (23) copyrights; (24) Indians and land reserved for the Indians; (25) naturalization and aliens; (26) marriage and divorce; (27) the criminal law, except the constitution of the courts of criminal jurisdiction, but including the procedure in criminal matters; (28) the establishment, maintenance and management of penitentiaries; (29) Supreme Court.

The Executive. The British sovereign is represented by a governor-general, appointed by the Crown. He is assisted by a council of 15 members, known as the King's Privy Council. The members of

the Council are heads of the various departments of government and constitute the ministry. They are appointed by the governor-general and approved by the House of Commons. The ministry consists of the following officers: (1) premier, or prime minister, who is usually president of the Council; (2) secretary of state; (3) minister of trade and commerce; (4) minister of justice and attorney-general; (5) minister of marine, fisheries and naval service; (6) minister of railways and canals; (7) minister of militia and defense; (8) minister of finance; (9) postmaster-general; (10) minister of agriculture; (11) minister of public works; (12) minister of interior; (13) minister of customs; (14) minister of inland revenue and mines; (15) minister of labor; there are also ministers without portfolios. A department of external affairs has been formed which has charge of all imperial and intercolonial correspondence. Each minister has a salary of $7000 and the prime minister has a salary of $12,000. All ministers with portfolios are members of the Dominion Parliament. As the representative of the Crown, the governor-general's powers are largely advisory. The governor-general-in-council has the power of veto, but he cannot exercise this power alone. With the advice of the Council he appoints the lieutenant-governors of the provinces and certain other officials. "He reigns but does not rule." His salary is $50,000 a year. The real executive officer of the Dominion is the premier.

The High Commissioner. As the Crown is represented by the governor-general, residing in Ottawa, so is the Dominion represented by the high commissioner for Canada residing in London. However, the duties of these two officials are not at all alike. The statute which provided for the appointment of a high commissioner for Canada became effective in 1880. It provided that he should take charge of the immigration offices and agencies in the United Kingdom, carry out such instructions as he might receive from time to time from the governor-in-council relating to the commercial, financial and general interests of Canada in the United Kingdom and elsewhere, and perform such other duties as are from time to time conferred upon him by the governor-in-council. He is appointed from the King's Privy Council for Canada.

Parliament. The legislative powers of the Dominion Government are vested in a Parliament of two houses, the Senate and House of Commons. The members of the Senate are nominated for life by summons of the governor-general under the Great Seal of Canada. A senator must be at least 30 years of age, must be a born or naturalized subject, must reside in the province for which he is chosen and must possess over and above all liabilities, property to the value of at least $4000. There are 87 senators appointed as follows: Ontario, 24; Quebec, 24; Nova Scotia, ten; New Brunswick, ten; Manitoba, Prince Edward Island, Alberta and Saskatchewan, four each; British Columbia, three.

The House of Commons consists of 221 members elected by popular vote, for five years, and apportioned among the various provinces as follows: Ontario, 86; Quebec, 65; Nova Scotia, 18; New Brunswick, 13; Manitoba, ten; British Columbia, seven; Prince Edward Island, four; Saskatchewan, ten; Alberta, seven; and Yukon Territory one. The basis of representation, determined after each census, was fixed in 1911 at one representative for every 30,582 inhabitants, determined as follows: Quebec has the fixed number, 65 members of Parliament. The total population of Quebec is divided by 65 and the quotient is the number of inhabitants for each representative from the other provinces. Each member has a salary of $2500, and the speaker has a salary of $4000. The salaries in the Senate are the same as those in the House of Commons. All measures relating to raising or expending public money must originate in the House of Commons, but with this exception the Senate has the same rights as the House in originating and introducing bills. A

bill must pass both houses to become a law.

Politically, Canada is divided into two parties, the Conservative and the Liberal. As in England, the party in power forms the government and the members of the ministry are drawn from that party. In case of an adverse vote, the ministry must resign, and when the party in power is unable to retain the support of the majority of the people, the governor-in-council may dissolve Parliament and order a new election, regardless of the period of five years for which each member of the House of Commons is elected.

Courts. The judges of the Dominion courts are appointed by the Dominion Government and hold office for life, or during good behavior. They can be removed only by the governor-general for cause. This plan assures a permanency and independence of the judiciary which entirely removes the judicial department of the government from political influence.

Local Government. The government of each province is on the same general plan as that of the Dominion. The executive branch consists of a lieutenant-governor, appointed by the governor-in-council, and an advisory, or executive, council, each member of which holds some provincial office, as the head of a department. The number of members of the executive council varies in the different provinces from five in British Columbia to eight in Ontario. The lieutenant-governor is appointed for five years and cannot be removed except for some specific cause, and the reason for his dismissal must be communicated to Parliament. He appoints the advisory council and has power to summon, prorogue or dissolve the Legislature, and with the advice of his council he may perform any executive acts necessary for governing his province. In short, within the limits of his jurisdiction he possesses the authority of a governor-general. In Quebec and Nova Scotia the legislative assembly consists of two bodies, a Legislative Council, appointed by the lieutenant-governor-in-council, and an Assembly elected by popular vote. In all the other provinces the Legislature consists of only one body. In all cases the members are elected by popular vote, the qualifications for electors being determined by each province. The Legislatures have authority to deal with matters pertaining to the respective provinces, but interprovincial matters are in the hands of the Dominion Government.

Each province has a system of courts presided over by judges, who are appointed and paid by the Dominion Government. Each province also has its own system of civil service, and the system of removing civil servants on a change in the government is unknown in Canada except for cause. Every civil servant holds office during good behavior. For a more detailed description see the subhead *Government* in the articles on the respective provinces.

FINANCE

Banks and Currency. The money system of Canada is on the decimal scale. The dollar of 100 cents is the standard unit. Fractional currency consists of 50 cent pieces, 25 cent pieces, 10 cent pieces, 5 cent pieces and 1 cent pieces. Gold coins of the values of $5, $10 and $20 respectively are authorized, and banks are allowed to issue notes of various denominations from $5 upwards, but the amount of notes issued by any bank cannot exceed the value of securities deposited by the bank with the Dominion Government. The large banks are chartered by the government and are authorized to establish branches. By this plan a few banks with large capital can serve many communities. The Dominion Government issues some notes, and there is a branch of the Royal Mint at Ottawa, where the coin for the Dominion is struck.

Savings Banks. Canada has four kinds of savings banks, the postal savings banks, the government savings banks of the Maritime Provinces, two special savings banks in Montreal and Quebec and savings-bank departments of the chartered banks. The total deposits in the savings banks of the Dominion for

1910 average $98.75 per capita of the population.

Revenue. The government revenue is derived from customs, excise duties, mining licenses, timber dues, the post office and the sale of public lands. For the fiscal year 1917-18, the total revenue was about $260,000,000. The gross national debt was $1,191,884,063, and the per capita indebtedness $138.00.

DEFENSE

Army. The military forces of Canada are under the Militia Council, with the minister of militia and defense as president. There is also an inspector-general, whose duty it is to inspect the forces and report to the minister of militia. The land forces are divided into active militia and reserve militia. The permanent force of the active militia includes only a small force of four squadrons, two batteries, one regiment of garrison artillery, five companies of engineers and a battalion of infantry. It is employed in garrisoning permanent ports, caring for the armament and providing the personnel for the various schools of military instruction. The nonpermanent part includes 27 regiments of mounted troops, 26 field batteries, six regiments of garrison artillery, five field companies of engineers and 106 regiments of infantry, a total of about 64,000 officers and men.

Militia. The active militia is raised by voluntary enlistment for a term of three years, but it can be increased by compulsion if necessary. The reserve militia is unorganized and includes all male citizens who are British subjects between the ages of 18 and 60 years, unless exempt or disqualified by law. There is a small naval militia engaged in protecting the fisheries.

INHABITANTS

Early Settlers. French traders and priests were the discoverers and first settlers of Canada, and when New France became British territory, they were allowed to enjoy the same laws and institutions as under the French Government. From this beginning sprang the French population of the Province of Quebec, which in 1911 exceeded 1,500,000. With this exception most of the inhabitants are English-speaking.

Immigration. Immigration has brought some Poles, Galicians and Russians into the Northwest Provinces and there are a few German settlements. A large number of immigrants from the United States have entered Alberta and Saskatchewan since 1900 and this region also contains a good number of Scotch and Irish from the Mother Country. The Indian population is about 100,000 and there are a few Chinese and Japanese in British Columbia.

Education. The duties of legislating on educational matters are imposed upon each province by the British North America Act. There is, therefore, no national system of education. The public school systems of the various provinces, however, are much the same, except as they are modified to meet local conditions, as in Quebec and Ontario, where denominational and separate schools are allowed. The public schools throughout the Dominion have a wide reputation for their high standard and excellent work. There are about 1,385,722 pupils in the schools and over 42,000 teachers are employed. See subhead *Education* in the articles on the respective provinces; also Education, National Systems of, subhead *Canada*; McGill College and University; Toronto, University of.

Religion. About 41 per cent of the inhabitants are communicants of the Roman Catholic Church, and 59 per cent belong to the various Protestant denominations. The leading Protestant denominations in order of membership are Methodists, Presbyterians, Anglicans and Baptists. There is no State religion or State Church. In all, there are about 30 denominations.

Literature. See the general article Literature, subhead *Canadian Literature.*

HISTORY

Early Explorations and Settlement (1534-1663). Omitting the explorations of the Norsemen, John Cabot, an English merchant, was the first Euro-

pean to see the coast of Canada, which he reached in his expedition in 1497 (See CABOT, JOHN). In the early part of the 16th century European fishermen began to frequent the waters off Newfoundland. In 1534 Jacques Cartier entered and named the Bay of Chaleurs and the following year sailed up the St. Lawrence as far as the present city of Montreal (See CARTIER, JACQUES). However, no attempts at settlement were made until the beginning of the 17th century. The leading spirit in this enterprise was Samuel Champlain, who sailed up the St. Lawrence in 1603, assisted the following year in founding Port Royal, the first permanent French settlement in North America, and in 1608 founded Quebec. From 1608 to his death in 1635 Champlain devoted his life to exploring the interior, establishing settlements and extending the fur trade. He extended his travels westward as far as Lake Huron, visited Lake Ontario and discovered the beautiful lake that bears his name. The greatest of French explorers, he justly acquired the title "Father of New France." See CHAMPLAIN, SAMUEL DE.

During the Thirty Years' War (1618-1648) Port Royal and other French settlements were captured by the British, but Canada was restored to the French by the Treaty of St. Germain-en-Laye in 1632. Following this, the Company of New France, also known as "The Company of One Hundred Associates," was formed for the purpose of exploiting the fur trade and founding settlements in Canada. The company was granted the entire St. Lawrence Valley for 15 years and in return was required to take to New France 300 settlers a year. This company controlled affairs in Canada until 1663, when it was disbanded and the Company of the West Indies was organized. The first company did not succeed in bringing settlers to New France, but the second company began with better prospects. In 1665 it sent about 2000 settlers and within a short time the French population was doubled. It soon proved a failure as a colonizing agency, however, and in 1674 its charter was revoked, and thereafter Canada was governed as a royal colony.

CANADA UNDER THE FRENCH. Meantime explorers, traders and missionaries of the Roman Catholic Church were penetrating the interior. Missions were founded among the Indians around the Great Lakes, extending as far west as the western part of Lake Superior. Those in Sault Ste. Marie, Michilimackinac and Green Bay occupied strategic points. In 1672 Joliet and Marquette discovered the Mississippi and descended it to the mouth of the Arkansas. The following year Marquette established a mission among the Kaskaskia Indians in the present State of Illinois. La Salle, bent upon the conquest of the Mississippi Valley, descended that river to its mouth and took possession of the great Mississippi Valley for France, naming it Louisiana. Almost constant warfare between the Huron and Iroquois Indians was a great drawback to the French settlers. The Iroquois finally nearly exterminated the Hurons, and the missionaries among them suffered the fate of the Indians. Since the Iroquois were hostile to the French, all outposts were in constant danger of attack.

In 1672 Count Frontenac was appointed governor of New France, and under his able, aggressive administration hostile factions were united and the Iroquois signally defeated. Ft. Frontenac (Kingston) was built and became a strong protection to outlying posts. Under Frontenac's encouragement La Salle attempted to found settlements at the mouth of the Mississippi, and though he failed, his effort led to the settlements at New Orleans, Biloxi and other points on the Lower Mississippi. Forts were established at Niagara, on the Illinois and Mississippi rivers. By this series of outposts the French hoped to guard the great inland empire and keep the Indians in check. In 1682 Frontenac's enemies secured his recall, and in the weak administration of his successor much that had been gained was lost.

Europe was organizing against French aggression, and the struggle between

France and England for the possession of North America was inevitable. In 1689 Frontenac was returned and governed New France until his death in 1698. Frontenac planned and executed a series of attacks on the English settlements in New England, which led to retaliations by the English that were disastrous to the French. The conflict was then suspended for a brief interval by the Treaty of Ryswick. The struggle was renewed in 1701 and in the next ten years France lost heavily in America. By the Treaty of Utrecht in 1713 she ceded to England her claims to Hudson Bay, Newfoundland and Nova Scotia, but retained the St. Lawrence Valley and Cape Breton Island. She built the fortress of Louisburg on Cape Breton. The mission stations at Sault Ste. Marie and Michilimackinac were important strategic points, as were Detroit, Niagara and the posts on the Ohio and Mississippi rivers. In the North fur traders had proceeded as far west as the Rocky Mountains. Had France been able to hold this vast expanse of territory the history of North America would have been far different.

In 1744 hostilities were again renewed, owing to the War of the Austrian Succession in Europe. In 1745 Louisburg was captured, but in the Treaty of Aix-la-Chapelle, it was restored to the French. During the next few years the French strengthened their outposts on the Mississippi and Ohio and on the Ohio came into conflict with the English in Virginia. In 1755 the English deported the French, who had settled in Acadia. This act was bitterly resented by the French throughout Canada and was one more cause which hastened the final struggle, generally known as the Seven Years' War. Hostilities began in 1755 with Braddock's expedition against Ft. Duquesne. During the first two years the French, under the able leadership of Montcalm, were generally successful. But they had neither the army nor the resources to compete with the superior numbers of the British, as soon as the latter were placed under efficient leaders. One British victory followed another until in 1769 Quebec fell into the hands of the British under the gallant leadership of General Wolfe. This virtually ended the war, though Montreal was not surrendered until the following year. By the Treaty of Paris, 1763, all French territory in America was surrendered to the British, except two small islands in the Gulf of St. Lawrence. See Quebec, Battle of; Ticonderoga; Wolfe, James; Montcalm, Louis Joseph.

Early English Rule. From 1763 to 1774 Canada was governed under royal proclamation; then a constitution was provided by the Quebec Act. The Roman Catholic Church was given its former privileges and the French civil law was established for the French settlements. During the American Revolution Canada was invaded, and the Revolutionists tried to induce Canada to join the other colonies. This Canada refused to do, and the invading army was defeated in its attack on Quebec in 1775 and compelled to return home. At the close of the war the boundary between Canada and the United States was, with the exception of a few irregularities, fixed as it is today. Many Royalists removed from the States to Canada, settling in Upper Canada, now Ontario, Nova Scotia and New Brunswick. These settlers exerted a strong influence on Canadian institutions in the following years.

Provincial Government Established. The influx of British subjects made a change of government necessary, and in 1791 Canada was separated by act of Parliament into Upper and Lower Canada, the Ottawa River forming the line of separation, and each province was given a government of its own. The population of Lower Canada was chiefly French, that of Upper Canada, British. From the beginning the provinces were antagonistic, because of the different nationalities. The war between England and the United States from 1812-15 served for a time to unite the provinces in a common interest, and Upper Canada suffered slightly from the invasion of American troops. When the war was

over, however, the old antagonism returned. In 1837 a few of the French in Lower Canada, under the leadership of Joseph Papineau, organized an armed rebellion. Following the example of Papineau, William Lyon Mackenzie called upon the people of Upper Canada to rise in rebellion. These were put down by the authorities before they reached large proportions, but they involved Canada in a controversy with the United States, because some of the rebels took advantage of the international boundary and secretly organized some of their forces in the United States. As soon as these operations became known, however, they were summarily stopped.

Following the rebellion Lord Durham was appointed governor-general, and he tried to allay racial strife, but was unsuccessful. Some of his measures were highly resented by the French and he was recalled at the end of five months. However, during this time he prepared a report upon the political situation that proved to be an epoch-making document. This report may be considered the first step towards forming the Confederation. In accordance with Lord Durham's suggestion in 1840, Upper and Lower Canada were united. Each province was equally represented in a single Parliament but the union was not a success. The French were suspicious of it and deadlocks in the Parliament were of common occurrence. Nevertheless the provinces increased in population and wealth. In 1854 Lord Elgin, who was then governor-general, negotiated a reciprocity treaty with the United States, which greatly increased Canada's trade. During the Civil War in the United States trade with that country was extensive. But at the close of the war the United States abrogated the treaty owing to the unfriendly attitude of Great Britain towards the North during that struggle. This led Canada to seek a market in the Mother Country, and with excellent success. The political situation, however, was still unsatisfactory.

THE FEDERATION. For some years the leading statesmen had foreseen that a union of all the provinces with greater independence of the Mother Country was necessary to Canada's future development. Lord Durham had recommended such a union in his famous report. In 1858 Sir Alexander Galt, an independent member of Parliament, strongly advocated such a union, and in 1864 Nova Scotia and New Brunswick began negotiations for uniting those provinces. In October of that year a conference of delegates from all the provinces was held in Quebec and adopted a series of resolutions which embodied a plan for union. The following year this plan was presented to the Parliament of Great Britain by a special commission, and this led to the passage of the British North America Act in 1867. This act went into effect July 1 of that year, when the Confederation officially came into existence. In honor of this great event, July 1 is "Dominion Day," and observed as a national holiday. Lord Monk was the first governor-general under the new regime, and Sir John A. Macdonald, often called the "Father of the Confederation," was the first prime minister.

RECENT DEVELOPMENT. The forming of the Confederation was the greatest event in Canadian history. It bound the separate provinces of British America into a nation and gave them a united purpose and policy. One of the conditions upon which Nova Scotia and New Brunswick came into the union was that the government should construct a line of railway extending from those provinces to Montreal, and in compliance with these conditions the Intercolonial Railway was built. Later, British Columbia came in on condition that a transcontinental railway should be constructed to that province, which led to the building of the Canadian Pacific, an enterprise of stupendous proportion for the country at the time it was undertaken. In 1869 negotiations were completed for the purchase by the Dominion of all the territory belonging to the Hudson's Bay Company. By this act all of British America, except Newfoundland, Labrador and two small

islands, came under control of the Confederation.

The increase in population since the first of the century has been such that two new provinces—Alberta and Saskatchewan—were organized. In 1914, Canada voluntarily accepted her responsibility as a member of the British Empire and at once raised a large expeditionary force for service in Europe. Subsequently, a universal service act was enacted and a draft resorted to, and more than half a million men were sent to Europe where they rendered notable service. American and Canadian troops fought side by side in Flanders.

Canada emerges from the conflict one of the strong, progressive members of the self governed group of nations forming the British Empire. Her institutions are on a solid basis, her government is careful and conservative, but withal progressive. See articles on the respective provinces; OTTAWA; MONTREAL; TORONTO; QUEBEC; and other leading cities of Canada. Consult Griffith's *The Dominion of Canada,* Cameron's *The New North* and Fraser's *Canada As It Is.*

Canada Goose, a bird of the Goose and Duck Family. This is the common wild goose. It measures from 25 to 43 inches in length. The head, neck and quill feathers are black; the body is gray; the upper and lower tail feathers, ventral region and band across the throat are white. The nest is built in a marsh and is made of grass and leaves, lined with down, and contains six or seven white eggs. These familiar game birds are features of the landscape in spring and fall, as they fly swiftly, often nearly half a mile, above the earth, uttering the familiar "honk, honk, honk." They are usually seen flying in a > shaped order, led by an old gander of experience. These birds breed from the northern part of the United States northward, and winter in Mexico. On their journeys north and south, they alight by streams and open ponds for food and rest, and fall an easy prey to the hunter.

Canada Thistle. See THISTLE.

Canadian River, a river of the United States. It rises in the northeastern part of New Mexico, flows eastward through the northwestern part of Texas and Oklahoma and enters the Arkansas about 45 m. above Ft. Smith. Its length is about 900 m.; its important tributary is the Rio Nutria, or North Fork. The Canadian is a shallow stream and not important to navigation.

Canal', an artificial waterway used for transportation, drainage or irrigation. When the term is used without qualification, it refers to a canal for transportation purposes. For drainage and irrigation canals see DRAINAGE; CHICAGO DRAINAGE CANAL; IRRIGATION.

Canals are of ancient origin, and were used by the Babylonians, Assyrians and Egyptians centuries before the Christian Era. The Egyptians connected the Nile with the Red Sea at an early date, probably 2000 B. C. This canal was destroyed, but was rebuilt 600 B. C. The Romans built canals from the Tiber and the lower Rhone to the sea, and connected the plains of Lombardy with the Adriatic. The Grand Canal in China, over 800 m. long, and requiring over two centuries to complete, is probably the first canal completed in the Christian Era. In 1681 the Languedoc Canal, connecting the Bay of Biscay with the Mediterranean, was completed. This canal was 148 m. long, contained 119 locks and had an elevation of 600 ft. At the time, it was the most extensive engineering work that had been undertaken in Europe.

CLASSIFICATION. Canals are classified according to their size, as ship canals and boat canals. Some of the most important ship canals are the Suez Canal, the Kiel Canal, the Manchester Canal, the Corinth Canal and the Panama Canal. Each of these is described under its title. Boat canals are smaller and admit of the transportation of boats and barges. Good representations are the Erie Canal in New York and the Caledonian Canal in Scotland. A tidewater canal is one that is at sea level through its entire course. A lock canal is one containing locks. A canalized river is one whose channel has been deepened or straightened, or both,

for the purpose of making it navigable. Europe has many such rivers.

Construction. The size of the canal is determined by the traffic it is to carry. The general rule is to make the bottom twice as wide as the widest vessels the canal is to carry, and the depth at least one foot and a half greater than the draught of these vessels. Of necessity, canals must be constructed on a level, and when elevations would require too deep cuts to bring the canal to sea level, it is constructed on different levels, called reaches. These are connected by locks. When the excavation is in soft earth or gravel, the banks are sloping, but when it is through solid rock, they are vertical. Because of the magnitude and expense of the work, canals are usually constructed by the government. Most of the canals in the United States have been constructed by the National Government, but the Erie Canal and a few others were constructed by the states through which they extend.

Locks. A canal lock is a chamber whose sides are vertical walls, and whose ends are closed by gates. The chamber is large enough to admit one or more boats at a time. The gates open up stream, and when closed form a V-shaped partition across the chamber, which enables them to resist the great pressure of the water. The gates are called leaves, and each leaf moves upon an upright post called the quoin post. The bottom or sides of the chamber are provided with valves, through which water may be let in or withdrawn. When a boat is to lock from a lower to a higher reach, it enters the chamber, and the gates at the lower end are closed. The valves are then opened, and the water flows into the chamber until it is on a level with that in the reach which the boat is to enter. The gates at the upper end are then opened, and the boat proceeds on its course. If the boat is to be lowered from a higher to a lower reach, it enters from the upper end of the chamber. The upper gates are then closed and the water is withdrawn. That in the chamber is on a level with the lower reach, when the gates at the lower end are opened and the boat moves on.

In some canals, boats are transferred from one reach to another by the use of inclined planes, over which they are moved by stationary engines. In other canals, lifts are used. A lift consists of two tanks, each large enough to hold a boat and so connected that when one tank is at the bottom of the lift, the other is at the top. The boat enters the tank and the ends are closed. A little more water is then run into the other tank, and this extra weight lifts the boat to the higher reach. If the boat is to be lowered, water is allowed to flow out of the opposite tank, until the tank containing the boat begins to lower. The largest device of this sort is at Petersborough, Ontario. The tanks consist of water-tight, steel boxes, and hold 1300 tons of water each. They are supported on towers of solid masonry 100 ft. high. A boat is transferred from a lower to a higher level in less than 12 minutes.

American Canals. The first canal in the United States was constructed around the rapids in the Connecticut River at South Hadley, Mass., in 1793. The Chesapeake & Ohio Canal was projected by Washington and others, who saw the need of communication between the Ohio Valley and the Atlantic, even before the adoption of the Constitution. This canal is now used almost entirely for transporting coal. The Delaware and Hudson Canal connecting Lake Champlain with the Hudson River was also early projected, but the Erie Canal, completed in 1825, was the first great work of this sort undertaken in America (See Erie Canal), and its opening was an epoch-making event in the commercial and industrial history of the country. Before 1840 a number of canals were completed, the two largest being the Ohio and Erie Canal, extending from Cleveland to Portsmouth on the Ohio River, and the Miami and Erie Canal, extending from Toledo to Cincinnati. A number of shorter canals were also constructed in the coal regions of Pennsylvania. Since the advent of railways, most of these

canals have been abandoned, and the others are but little used.

The canal system of the Great Lakes is partly in the United States and partly in Canada, and includes the canals at Sault Ste. Marie, on both the American and the Canadian sides, the canalized channels in the St. Mary's and St. Clair rivers, the Welland Canal and the series of canals around the rapids in the St. Lawrence River. The total mileage of the system is about 74 m. (See SAULT STE. MARIE CANALS; WELLAND CANAL). A ship canal across Cape Cod Peninsula will give Boston more direct connection with the open sea and be of great value to that city. The canal mileage of the United States is about 4300 m.

EUROPEAN CANALS. The canals constructed by the Romans were the foundation of the present canal systems in Europe. Most European canals are boat canals, and they have been constructed for the purpose of connecting navigable rivers, so that a system of inland waterways has been completed, which enables boats to pass between nearly all the important commercial cities of the Continent. Much of the work on these waterways has been canalizing rivers. Many similar canals are also found in Great Britain. Russia leads all the countries in mileage, as shown by the following table:

COUNTRY	MILES
Russia	12,000
Great Britain	3,900
France	3,000
Austria-Hungary	2,750
Germany	2,700

Canandaigua, *Kan" an da' gwa,* **N. Y.,** county seat of Ontario Co., at the northern end of Canandaigua Lake, 29 m. s.e. of Rochester, on the New York Central, the Northern Central and the Rochester & Eastern Interurban railroads. The site is elevated and commands a beautiful view of the lake, upon which steamboats ply. The city has handsome private residences and contains Wood Library, an orphan asylum, Canandaigua Academy and private institutions for the aged and insane. Its manufactures include agateware, wire fence, pressed bricks, cigars, etc. Population in 1920, 7,356.

Cana'ry, a bird of the Finch Family. This familiar songster was originally an inhabitant of the Canary Islands. In this locality its color was grayish above and yellowish below, but domestication and artificial breeding have changed the bird to a more or less uniform yellow. In the Canary Islands the nest is built in trees or shrubs and four or five broods are raised annually. The canary is the most familiar cage bird and has been trained to sing various notes in addition to those originally bestowed by nature. In various parts of Europe, especially in the Tyrol Mountains, the breeding of these birds is carried on as a regular business, and thousands are sold to tourists or exported to various parts of the world. The prices vary with the singing qualities. A good bird may be bought for from one to five dollars, but $150 has been paid for an unusually fine singer. The canary was first used as a cage bird in the 16th century.

Canary Islands, or **Canaries,** a group of islands in the Atlantic Ocean, between 60 and 70 m. n.w. of the coast of Africa. The territory, including 2808 sq. m., is a Spanish possession. Seven of the largest islands are inhabited; namely, Teneriffe, Gran Canaria, Palma, Gomera, Ferro, Fuerteventura and Lanzarote; the other six are mere islets. All are of volcanic origin, and many of the coasts are precipitous and rocky, while numerous extinct volcanoes are found. The Peak of Teneriffe, rising to an elevation of 12,190 ft., is the highest summit. The climate is healthful and mild, but the rainfall is deficient, and the hot winds which blow from Africa injure the vegetation. Fruits, potatoes and onions are the chief products, and form important exports to the West Indies. There is little manufacture, except that of linen, and silk and cotton fabrics. Among the ancients—and it is thought that the Canaries were known both to the Phœnicians and the Carthaginians—the islands were called Fortunate Isles. They were dis-

covered (for the Europeans) by the Spaniards during the 14th century. After passing into the hands of the Portuguese and, later, the French, they were restored to Spain at the end of the 15th century. The capital is Santa Cruz. Population estimated at 500,000.

Can'by, Edward Richard Sprigg (1819-1873), an American soldier, born in Kentucky. He graduated at West Point in 1839, and served in the Seminole and Mexican wars. During the Civil War he commanded the Union forces in New Mexico and was in command in New York during the draft riots in 1863. He was made major-general of volunteers in 1864 and brigadier-general in the regular army in 1866. In 1865 he captured Mobile and received from Gen. Richard Taylor the surrender of the last Confederate army in the field. He was later placed in command of the Department of Columbia, and, while treating with the Modoc Indians in 1873, was treacherously shot while under a flag of truce.

Cancer, *Kan'ser,* a term applied to a variety of malignant and morbid tumor, which attacks man and most Vertebrates. The disease occurs in several different forms, all of which have certain characteristics in common—a mass of cells and whitish cancer fluid, enclosed in a fibrous framework. They have no well-defined limits, and the cells may make extensive invasions into neighboring areas. It is this peculiarity that makes the disease so baffling to the physicians and which leads to the popular notion that cancers have roots. The disease develops in the following manner. Certain of the body cells will begin to grow and multiply at a rapid rate in some one part of the body. They soon encroach upon the surrounding tissue and ultimately destroy it. The cells are carried by the blood lymph to other parts of the body, where a secondary growth, similar to the parent growth, is started. This colonizing may occur in many parts of the organism until the destruction of the tissues results in death. The principal varieties of cancer are scirrhus, or hard cancer, encephaloid, or soft cancer, and epithelial cancer.

In recent years painstaking and elaborate investigations have been carried on in an attempt to discover the cause and the cure of cancer, but little is definitely known of it. It attacks women oftener than men and usually occurs in middle or old age, rarely in youth. Tubercular persons are seldom its victims. In the majority of cases the immediate cause has been found to be continued irritation of a small surface area. There have been many attempts to cure cancer by means of radiotherapy, phototherapy and by trypsin, but without success. A strong predisposition to cancer is believed by the best authorities to be communicable by heredity.

Cancer, The Crab, the fourth sign of the zodiac, also the name of a constellation. The sun enters the sign about June 21 and leaves it a month later. The symbol is ♋. The constellation now occupies the sign Leo in the zodiac. The constellation contains no bright stars, but is of great interest when viewed through the telescope. The cluster which appears to the naked eye as a spot of milky light is then resolved into the beautiful star cluster known as the Beehive.

Can'dle, a device for producing light, formed like a rod and consisting of some fatty substance like tallow, with a wick through its center. There are two methods of making candles. The oldest way is by dipping a frame carrying a number of stretched wicks into a basin of melted tallow repeatedly until a sufficient amount adheres. The other and better way is by molding them, as they are more regular in shape and burn more uniformly. Sperm candles are composed of spermaceti and beeswax. Paraffin candles are much preferred to all others on account of their giving a clear, brilliant light. Candles were relied on almost entirely in ancient times for illumination, until about the middle of the last century, when oil lamps begun to displace them, but even now all lights are measured by the light of so many candles, or candle power.

Can'dleber"ry. See WAX MYRTLE.